ESIE09-08A

Service Manual

Daikin ALTHERMA HT

ERSQ 011/014/016 AA V1, Y1
ERRQ 011/014/016 AA V1, Y1
EKHBRD 011/014/016 AA/AB/AC V1, Y1
R-410A, R-134a
EKHTS(U) 200/260 A, AB, AC
EKBUHAA6 V3, W1

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1. Introduction

1.1 Safety Cautions

Cautions and Warnings

- Be sure to read the following safety cautions before conducting repair work.
- The caution items are classified into “⚠**Warning**” and “⚠**Caution**”. The “⚠**Warning**” items are especially important since they can lead to death or serious injury if they are not followed closely. The “⚠**Caution**” items can also lead to serious accidents under some conditions if they are not followed. Therefore, be sure to observe all the safety caution items described below.
- About the pictograms

△ This symbol indicates an item for which caution must be exercised.
The pictogram shows the item to which attention must be paid.

○ This symbol indicates a prohibited action.
The prohibited item or action is shown inside or near the symbol.

● This symbol indicates an action that must be taken, or an instruction.
The instruction is shown inside or near the symbol.

- After the repair work is complete, be sure to conduct a test operation to ensure that the equipment operates normally, and explain the cautions for operating the product to the customer

1.1.1 Caution in Repair

⚠ **Warning**	
Be sure to disconnect the power cable plug from the plug socket before disassembling the equipment for a repair. Working on the equipment that is connected to a power supply can cause an electrical shock. If it is necessary to supply power to the equipment to conduct the repair or inspecting the circuits, do not touch any electrically charged sections of the equipment. Be careful as the capacitors (top surfaces) can hold up to 220V.	🔌
If the refrigerant gas discharges during the repair work, do not touch the discharging refrigerant gas. The refrigerant gas can cause frostbite.	⊘
When disconnecting the suction or discharge pipe of the compressor at the welded section, release the refrigerant gas completely at a well-ventilated place first. If there is a gas remaining inside the compressor, the refrigerant gas or refrigerating machine oil discharges when the pipe is disconnected, and it can cause injury.	
If the refrigerant gas leaks during the repair work, ventilate the area. The refrigerant gas can generate toxic gases when it contacts flames.	❗
The step-up capacitor supplies high-voltage electricity to the electrical components of the outdoor unit and indoor unit. Be sure to discharge the capacitor completely before conducting repair work. A charged capacitor can cause an electrical shock as the capacitors (top surfaces) can hold up to 220V.	⚡
Do not start or stop the heat pump operation by plugging or unplugging the power cable plug. Plugging or unplugging the power cable plug to operate the equipment can cause an electrical shock or fire.	⊘

⚠ **Caution**	
Do not repair the electrical components with wet hands. Working on the equipment with wet hands can cause an electrical shock.	⊘
Do not clean the heat pump by splashing water. Washing the unit with water can cause an electrical shock.	⊘
Be sure to provide the grounding when repairing the equipment in a humid or wet place, to avoid electrical shocks.	⏚
Be sure to turn off the power switch and unplug the power cable when cleaning the equipment. The internal fan rotates at a high speed, and cause injury.	🔌
Do not tilt the unit when removing it. The water inside the unit can spill and wet the furniture and floor.	⊘
Be sure to check that the refrigerating cycle section has cooled down sufficiently before conducting repair work. Working on the unit when the refrigerating cycle section is hot can cause burns.	
Use the welder in a well-ventilated place. Using the welder in an enclosed room can cause oxygen deficiency.	❗

1.1.2 Cautions Regarding Products after Repair

⚠ **Warning**	
Be sure to use parts listed in the service parts list of the applicable model and appropriate tools to conduct repair work. Never attempt to modify the equipment. The use of inappropriate parts or tools can cause an electrical shock, excessive heat generation or fire.	
When relocating the equipment, make sure that the new installation site has sufficient strength to withstand the weight of the equipment. If the installation site does not have sufficient strength and if the installation work is not conducted securely, the equipment can fall and cause injury.	
Be sure to use an exclusive power circuit for the equipment, and follow the technical standards related to the electrical equipment, the internal wiring regulations and the instruction manual for installation when conducting electrical work. Insufficient power circuit capacity and improper electrical work can cause an electrical shock or fire.	
Be sure to use the specified cable to connect between the indoor and outdoor units. Make the connections securely and route the cable properly so that there is no force pulling the cable at the connection terminals. Improper connections can cause excessive heat generation or fire.	
When connecting the cable between the indoor and outdoor units, make sure that the terminal cover does not lift off or dismount because of the cable. If the cover is not mounted properly, the terminal connection section can cause an electrical shock, excessive heat generation or fire.	

⚠ Warning	
Do not damage or modify the power cable. Damaged or modified power cable can cause an electrical shock or fire. Placing heavy items on the power cable, and heating or pulling the power cable can damage the cable.	⊘
Do not mix air or gas other than the specified refrigerant (R-410A / R-134a) in the refrigerant system. If air enters the refrigerating system, an excessively high pressure results, causing equipment damage and injury.	
If the refrigerant gas leaks, be sure to locate the leak and repair it before charging the refrigerant. After charging refrigerant, make sure that there is no refrigerant leak. If the leak cannot be located and the repair work must be stopped, be sure to perform pump-down and close the service valve, to prevent the refrigerant gas from leaking into the room. The refrigerant gas itself is harmless, but it can generate toxic gases when it contacts flames, such as fan and other heaters, stoves and ranges.	❗

⚠ Caution	
Installation of a leakage breaker is necessary in some cases depending on the conditions of the installation site, to prevent electrical shocks.	
Do not install the equipment in a place where there is a possibility of combustible gas leaks. If a combustible gas leaks and remains around the unit, it can cause a fire.	⊘
Be sure to install the packing and seal on the installation frame properly. If the packing and seal are not installed properly, water can enter the room and wet the furniture and floor.	For integral units only

1.1.3 Inspection after Repair

⚠ Warning	
Check to make sure that the power cable plug is not dirty or loose, then insert the plug into a power outlet all the way. If the plug has dust or loose connection, it can cause an electrical shock or fire.	❗
If the power cable and lead wires have scratches or deteriorated, be sure to replace them. Damaged cable and wires can cause an electrical shock, excessive heat generation or fire.	❗
Do not use a joined power cable or extension cable, or share the same power outlet with other electrical appliances, since it can cause an electrical shock, excessive heat generation or fire.	⊘

⚠ Caution	
Check to see if the parts and wires are mounted and connected properly, and if the connections at the soldered or crimped terminals are secure. Improper installation and connections can cause excessive heat generation, fire or an electrical shock.	
If the installation platform or frame has corroded, replace it. Corroded installation platform or frame can cause the unit to fall, resulting in injury.	

⚠ **Caution**	
Check the grounding, and repair it if the equipment is not properly grounded. Improper grounding can cause an electrical shock.	⏚
Be sure to measure the insulation resistance after the repair, and make sure that the resistance is 1 Mohm or higher. Faulty insulation can cause an electrical shock.	
Be sure to check the drainage of the indoor unit after the repair. Faulty drainage can cause the water to enter the room and wet the furniture and floor.	

1.1.4 Using Icons

Icons are used to attract the attention of the reader to specific information. The meaning of each icon is described in the table below:

1.1.5 Using Icons List

Icon	Type of Information	Description
ℹ Note:	Note	A “note” provides information that is not indispensable, but may nevertheless be valuable to the reader, such as tips and tricks.
⚠ Caution	Caution	A “caution” is used when there is danger that the reader, through incorrect manipulation, may damage equipment, loose data, get an unexpected result or has to restart (part of) a procedure.
⚠ Warning	Warning	A “warning” is used when there is danger of personal injury.
↳	Reference	A “reference” guides the reader to other places in this binder or in this manual, where he/she will find additional information on a specific topic.

1.2 PREFACE

Thank you for your continued patronage of Daikin products.

This is the new service manual for Daikin's Year 2009 Daikin Altherma HT (high temperature) air to water heat pump.
Daikin offers a wide range of models to respond to the residential heating market. We are confident that customers will be able to find the models that best suit their needs.

This service manual contains information regarding the servicing of Daikin Altherma HT (R-410A & R-134a) Heat Pump System.

August, 2009

After Sales Service Division

Part 1 - General Information

1. Model Names of Indoor/Outdoor Units & Tanks 2

1. Model Names of Indoor/Outdoor Units & Tanks

Indoor Units

Type	Model Name	Version			Power Supply
EKHBRD	011	AA	AB	AC	V1
	014				
	016				
EKHBRD	011	AA	AB	AC	Y1
	014				
	016				

Outdoor Units

Type	Model Name	Version	Power Supply
ERRQ	011	AA	V1
	014		
	016		
ERRQ	011	AA	Y1
	014		
	016		
ERSQ	011	AA	V1
	014		
	016		
ERSQ	011	AA	Y1
	014		
	016		

Tank

Model Name	Version		
EKHTS 200	AA	AB	AC
EKHTS 260			
EKHTSU 200	AA	AB	AC
EKHTSU 260			

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1. Specifications

1.1 Outdoor Units

Capacity Information

For combination indoor units + outdoor units	Indoor Units				EKHBRD011AA/AB/AC(V1/Y1)	EKHBRD014AA/AB/AC(V1/Y1)	EKHBRD016AA/AB/AC(V1/Y1)
	Condition 1	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	3,57	4,66	5,57
		COP	Nominal		3,08	3,00	2,88
	Condition 2	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	4,40	5,65	6,65
		COP	Nominal		2,50	2,48	2,41
	Condition 3	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	2,61	3,55	4,31
		COP	Nominal		4,22	3,94	3,72
Notes Condition 1 EW: 55°C, LW: 65°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 2 EW: 70°C, LW: 80°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 3 EW: 30°C, LW: 35°C, ΔT=5°C Ambient conditions: 7°CDB/6°CWB					Remark: This data is only valid in combination of indoor unit with ER(R/S)Q outdoor unit		

Technical Specifications

Outdoor units					ER(S/R)Q011AA(V1/Y1)	ER(S/R)Q014AA(V1/Y1)	ER(S/R)Q016AA(V1/Y1)
Casing	Colour				Daikin White	Daikin White	Daikin White
	Material				Painted galvanised steel	Painted galvanised steel	Painted galvanised steel
Dimensions	Unit	Height		mm	1345	1345	1345
		Width		mm	900	900	900
		Depth		mm	320	320	320
	Packing	Height		mm	1524	1524	1524
		Width		mm	980	980	980
		Depth		mm	420	420	420
Weight	Unit			kg	120	120	120
	Packed Unit			kg	130	130	130
Packing	Material				Cardboard + Wood + EPS	Cardboard + Wood + EPS	Cardboard + Wood + EPS
	Weight			kg	8	8	8
Heat Exchanger	Specifications	Length		mm	857	857	857
		Nr of Rows			2	2	2
		Fin Pitch		mm	2	2	2
		Nr of Passes			10	10	10
		Face Area		m²	1,131	1,131	1,131
		Nr of Stages			60	60	60
		Empty Tubeplate Hole			0	0	0
	Tube type				Hi-XSS	Hi-XSS	Hi-XSS
	Fin	Type			Non-symmetric waffle louvre	Non-symmetric waffle louvre	Non-symmetric waffle louvre
		Treatment			Corrosion resistant	Corrosion resistant	Corrosion resistant
Fan	Type				Propellor	Propellor	Propellor
	Quantity				2	2	2
	Discharge direction				Horizontal	Horizontal	Horizontal
	Motor	Quantity			2	2	2
		Model			Brushless DC motor	Brushless DC motor	Brushless DC motor
		Output		W	70	70	70
		Drive			Direct drive	Direct drive	Direct drive
Compressor	Quantity				1	1	1
	Motor	Type			Hermetically sealed scroll compressor	Hermetically sealed scroll compressor	Hermetically sealed scroll compressor
		Starting Method			Direct on line	Direct on line	Direct on line
		Crankcase Heater	Quantity		1	1	1
			Output	W	33	33	33
Operation Range (1)	Heating	Minimum ambient		°C	-20	-20	-20
		Maximum ambient		°C	20	20	20
	Domestic hot water	Minimum ambient		°C	-20	-20	-20
		Maximum ambient		°C	35	35	35

Outdoor units				ER(S/R)Q011AA(V1/Y1)	ER(S/R)Q014AA(V1/Y1)	ER(S/R)Q016AA(V1/Y1)
Sound Level (nominal)	Heating	Sound Power	dBA	See technical data		
		Sound Pressure	dBA			
Refrigerant	Type			R-410A	R-410A	R-410A
	Charge		kg	4,5	4,5	4,5
	Control			Expansion valve (electronic)	Expansion valve (electronic)	Expansion valve (electronic)
	Nr of Circuits			1	1	1
Refrigerant Oil	Type			Daphne FVC68D	Daphne FVC68D	Daphne FVC68D
	Charged Volume		l	1,5	1,5	1,5
Piping Connections	Liquid	Quantity		1	1	1
		Type		Flare	Flare	Flare
		Diameter (OD)	mm	9,52	9,52	9,52
	Gas	Quantity		1	1	1
		Type		Flare	Flare	Flare
		Diameter (OD)	mm	15,9	15,9	15,9
	Drain	Quantity		3	3	3
		Diameter (OD)	mm	26 x 3	26 x 3	26 x 3
	Piping Length	Minimum	m	3	3	3
		Maximum	m	50	50	50
		Equivalent	m	63	63	63
		Chargeless	m	10	10	10
	Additional Refrigerant Charge		kg/m	see installation manual	see installation manual	see installation manual
	Installation height difference	Maximum	m	30	30	30
	Heat Insulation			Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes
Defrost Method				Reversed cycle	Reversed cycle	Reversed cycle
Defrost Control				Sensor for outdoor heat exchanger temperature	Sensor for outdoor heat exchanger temperature	Sensor for outdoor heat exchanger temperature
Capacity Control Method				Inverter controlled	Inverter controlled	Inverter controlled
Safety Devices (pressure)				HPS	HPS	HPS
Safety Devices (fan)				Fan motor thermal protector	Fan motor thermal protector	Fan motor thermal protector
Safety Devices (inverter)				Inverter overload protector	Inverter overload protector	Inverter overload protector
Safety Devices (pcb)				PC board fuse	PC board fuse	PC board fuse
Standard Accessories	Item			Installation manual	Installation manual	Installation manual
	Quantity			1	1	1
Design pressure (high pressure side)			bar	40	40	40
Notes (1): for details see operation range TW drawing						

Electrical Specifications

Power Supply	Name			ER(S/R)Q(011/014/016)AAV1	ER(S/R)Q(011/014/016)AAY1
	Phase			1~	3~
	Frequency		Hz	50	50
	Voltage		V	220-240	380-415
	Voltage Range	Minimum	V	198	342
		Maximum	V	254	440
Current	Z-max (2)		Ω	0,28	-
	Minimum Ssc (3) value		kVa	Equipment complying with EN/IEC 61000-3-12 (1)	-
	Maximum running Current	Heating	A	27	13,5
	Recommended fuses		A	32	16
Wiring Connections	For power supply	Quantity		2G	4G
		Wire type		Note (4)	Note (4)
	For connection with indoor unit	Quantity		2	
		Remark		F1+F2	
Power Supply Intake				Both indoor and outdoor unit	
Notes (1): European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16A and ≤ 75A per phase (2): In accordance with EN/IEC 61000-3-11 (5), it may be necessary to consult the distribution network operator to ensure that the equipment is connected only to a supply with Zsys (6) ≤ Zmax (3): Short-circuit power (4): Select diameter and type according to national and local regulations (5): European/International Technical Standard setting the limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤ 75A (6): System impedance					

1.2 Indoor Unit

Capacity Information

For combination indoor units + outdoor units	**Indoor Units**				**EKHBRD011AA/AB/AC(V1/Y1)**	**EKHBRD014AA/AB/AC(V1/Y1)**	**EKHBRD016AA/AB/AC(V1/Y1)**
	Condition 1	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	3,57	4,66	5,57
		COP	Nominal		3,08	3,00	2,88
	Condition 2	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	4,40	5,65	6,65
		COP	Nominal		2,50	2,48	2,41
	Condition 3	Heating capacity	Nominal	kW	11	14	16
		Heating PI	Nominal	kW	2,61	3,55	4,31
		COP	Nominal		4,22	3,94	3,72
Notes Condition 1 EW: 55°C, LW: 65°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 2 EW: 70°C, LW: 80°C, ΔT=10°C Ambient conditions: 7°CDB/6°CWB Condition 3 EW: 30°C, LW: 35°C, ΔT=5°C Ambient conditions: 7°CDB/6°CWB					Remark: This data is only valid in combination of indoor unit with ER(R/S)Q outdoor unit		

Technical Specifications

Indoor units				**EKHBRD011AA/AB/AC(V1/Y1)**			**EKHBRD014AA/AB/AC(V1/Y1)**			**EKHBRD016AA/AB/AC(V1/Y1)**		
				AA	AB	AC	AA	AB	AC	AA	AB	AC
Casing	Colour			Metallic Grey			Metallic Grey			Metallic Grey		
	Material			pre coated sheetmetal			pre coated sheetmetal			pre coated sheetmetal		
Dimensions	Packing	Height	mm	860			860			860		
		Width	mm	680			680			680		
		Depth	mm	800			800			800		
	Unit	Height	mm	705			705			705		
		Width	mm	600			600			600		
		Depth	mm	695			695			695		
Weight	Machine weight		kg	144,25 / 147,25			144,25 / 147,25			144,25 / 147,25		
	Gross weight		kg	153 / 156			153 / 156			153 / 156		
Packing	Material			EPS, Cardboard, MDF, Wood (pallet), Metal			EPS, Cardboard, MDF, Wood (pallet), Metal			EPS, Cardboard, MDF, Wood (pallet), Metal		
	Weight		kg	8,75			8,75			8,75		

Indoor units					**EKHBRD011AA/AB/AC(V1/Y1)**			**EKHBRD014AA/AB/AC(V1/Y1)**			**EKHBRD016AA/AB/AC(V1/Y1)**		
Main components					AA	AB	AC	AA	AB	AC	AA	AB	AC
	Refrigerant side heat exchanger	Type			Plate heat exchanger			Plate heat exchanger			Plate heat exchanger		
		Quantity			1 (60 plates)			1 (60 plates)			1 (60 plates)		
		Material			AISI 316			AISI 316			AISI 316		
		Insulation material			EPDM type	Thermal felt/foam	PPE foam	EPDM type	Thermal felt/foam	PPE foam	EPDM type	Thermal felt/foam	PPE foam
	Cascade compressor	Quantity			1			1			1		
		Motor	Type		Hermetically sealed scroll compressor			Hermetically sealed scroll compressor			Hermetically sealed scroll compressor		
			Starting Method		Direct online			Direct online			Direct online		
			Crankcase Heater	Quantity		1		1	1		1	1	
			Crankcase Heater Output	W	33	33		33	33		33	33	
	Pump	Type			DC motor			DC motor			DC motor		
		Nr. of speed			inverter controlled			inverter controlled			inverter controlled		
		Nominal ESP unit (1)	Heating	kPa	94,0	92	92	91,9	88	88	89,7	85	85
		Power input		W	87			95			101		
	Water side Heat exchanger	Type			Plate heat exchanger			Plate heat exchanger			Plate heat exchanger		
		Quantity			1 (50 plates)			1 (50 plates)			1 (50 plates)		
		Material			AISI 316			AISI 316			AISI 316		
		Water volume		l	2,78			2,78			2,78		
		Water flow rate Nom. (1)		l/min	15,8			20,1			22,9		
		Water flow rate Max. (2)		l/min	31,6			40			45,8		
		Insulation material			EPDM type	Thermal felt/foam	PPE	EPDM type	Thermal felt/foam	PPE	EPDM type	Thermal felt/foam	PPE
	Expansion vessel	Volume		l	12			12			12		
		Max. water pressure		bar	3			3			3		
		Pre pressure		bar	1			1			1		
	Water filter	Diameter perforations		mm	1			1			1		
		Material			Brass			Brass			Brass		
Water circuit	Piping connections diameter			inch	G 1”1/4 (female)			G 1”1/4 (female)			G 1”1/4 (female)		
	Piping			inch	1”			1”			1”		
	Safety valve			bar	3			3			3		
	Manometer			Y/N	Y			Y			Y		
	Drain valve / Fill valve			Y/N	Y			Y			Y		
	Shut off valve			Y/N	Y			Y			Y		
	Air purge valve			Y/N	Y			Y			Y		
	Heating water system minimum water volume			l	20			20			20		
	Heating water system maximum water volume			l	400			400			400		
Refrigerant Circuit	Gas side diameter			mm	15,9			15,9			15,9		
	Liquid side diameter			mm	9,52			9,52			9,52		
	Type			Casc.	R134a			R134a			R134a		
	Charged amount			Casc.									
	Design pressure (high pressure side)			bar	38			38			38		
Refrigerant oil	Type			Casc.	Daphne FVC68D			Daphne FVC68D			Daphne FVC68D		
	Charged amount			Casc.	1,5l			1,5l			1,5l		
Sound Level (3)	Sound Pressure at 55 - 65 °C [EW - LW] (4)			dBA	43			45			46		
	Sound Pressure at 70 - 80 °C [EW - LW] (4)			dBA	46			46			46		
	Sound Pressure low sound mode n° 1 at 55 - 65 °C [EW - LW] (4)			dBA	40			43			45		
Operation range (5)	Ambient	Minimum		°C	-20			-20			-20		
		Maximum		°C	20/(35)(6)			20/(35)(6)			20/(35)(6)		
	Waterside	Minimum LW		°C	25			25			25		
		Maximum LW		°C	80			80			80		
Installation place					Indoor			Indoor			Indoor		

Notes
(1): for ΔT = 10°C
(2): for ΔT = 5°C
(3): The data mentioned is valid in free field condition because it is measured in a semi-anechoic room. Measured value under actual installation conditions will be higher due to environmental noise and sound reflections. These values are sound pressure levels measured at all sides (front / back / left / right / top) at 1m distance (see engineering data book for more details). The values do not occur simultaneously on all mentioned sides
(4): EW = entering water temperature - LW = leaving water temperature
(5): for details see operation range TW drawing
(6): for DHW operation

Electrical Specifications

Power Supply	Name			EKHBRD(011/014/016)AA/AB/ ACV1			EKHBRD(011/014/016)AA/AB/ ACY1		
				11	14	16	11	14	16
	Phase			1~			3~		
	Frequency		Hz	50			50		
	Voltage		V	220-240			380-415		
	Voltage Range	Minimum	V	198			342		
		Maximum	V	254			440		
Current	Z-max (2)		Ω	0,34	0,32	0,32	-		
	Minimum Ssc (3) value		kVa	Equipment complying with EN/IEC 61000-3-12 (1)			-		
	Maximum running Current	Heating	A	22,5	23,8	23,8	12,5		
	Recommended fuses		A	25			16		
Wiring Connections	For power supply	Quantity		2G			4G		
		Wire type		Note (4)			Note (4)		
	For power supply (5)	Quantity		2G + 2G			4G + 2G		
		Wire type		Note (4)			Note (4)		
	For connection with outdoor unit	Quantity		2					
		Remark		F1+F2					
Power Supply Intake				Both indoor unit and outdoor unit					

Notes
(1): European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16A and ≤ 75A per phase
(2): In accordance with EN/IEC 61000-3-11 (6), it may be necessary to consult the distribution network operator to ensure that the equipment is connected only to a supply with Zsys (7) ≤ Zmax
(3): Short-circuit power
(4): Select diameter and type according to national and local regulations
(5): In case of benefit kWh rate power supply installations
(6): European/International Technical Standard setting the limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤ 75A
(7): System impedance

Part 3 - Refrigerant Circuit & Functional Parts

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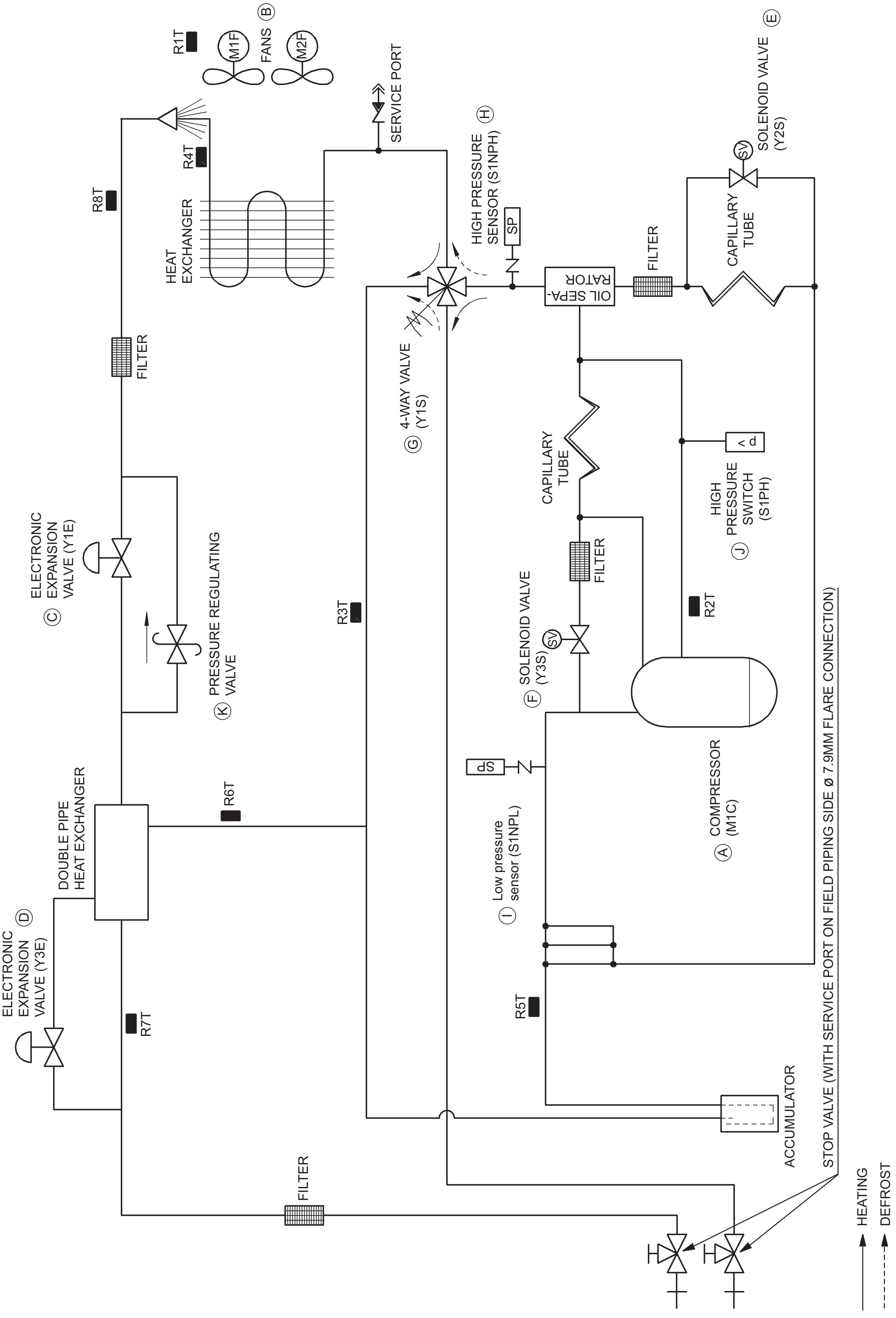
1. Refrigerant Circuit

1.1 Outdoor Unit

ERRQ - ERSQ

No. in refrigerant system diagram	Symbol	Name	Major Function
A	M1C	Inverter compressor (INV)	Inverter compressor is operated on frequencies between 36 Hz and 195 Hz by using the inverter. In total there are 31 steps.
B	M1F M2F	Inverter fan	Since the system is of air heat exchanging type, the fan is operated at 8 (9)-step rotation speed by using the inverter.
C	Y1E	Electronic expansion valve (Main: EV1)	While in heating operation, PI control is applied to keep the outlet superheated degree of air heat exchanger constant.
D	Y3E	Electronic expansion valve (Subcool: EV3)	Pl control is applied to keep the outlet superheated degree of subcooling heat exchanger constant.
E	Y2S	Solenoid valve (Hot gas: SVP)	Used to prevent the low pressure from transient falling.
F	Y3S	Solenoid valve (Unload circuit SVUL)	Used to the unloading operation of compressor.
G	Y1S	Four way valve	Used to switch the operation mode between defrosting and heating. Activated during heating (opposite concerning indoor unit).
H	S1NPH	High pressure sensor	Used to detect high pressure.
I	S1NPL	Low pressure sensor	Used to detect low pressure.
J	S1PH	HP pressure switch (For INV compressor)	In order to prevent the increase of high pressure when a malfunction occurs, this switch is activated at high pressure of 4.0 MPa or more to stop the compressor operation.
K	—	Pressure regulating valve 1 (Receiver to discharge pipe)	This valve opens at a pressure of 4.0 MPa for prevention of pressure increase, thus resulting in no damage of functional parts due to the increase of pressure in transportation or storage.
1	R1T	Thermistor (Outdoor air: Ta)	Used to detect outdoor temperature, correct discharge pipe temperature, and others.
2	R2T	Thermistor (INV discharge pipe: Tdi)	used to detect discharge pipe temperature, make the temperature protection control of compressor, and others.
3	R3T	Thermistor (Suction pipe1: Ts1)	used to detect suction pipe temperature, keep the suction superheated degree constant in heating operation, and others.
4	R4T	Thermistor (Heat exchanger deicer: Tb)	Used to detect liquid pipe temperature of air heat exchanger, determine defrosting operation, and others.
5	R5T	Thermistor (Suction pipe2: Ts2)	Used to the calculation of superheat and internal temperature of compressor etc.
6	R6T	Thermistor (Subcooling heat exchanger gas pipe: Tsh)	Used to control of subcooling electronic expansion valve.
7	R7T	Thermistor (Liquid pipe1: Tl1)	Liquid thermistor (internal control), and others.
8	R8T	Thermistor (Liquid pipe2: Tl2)	Liquid thermistor (internal control), and others.

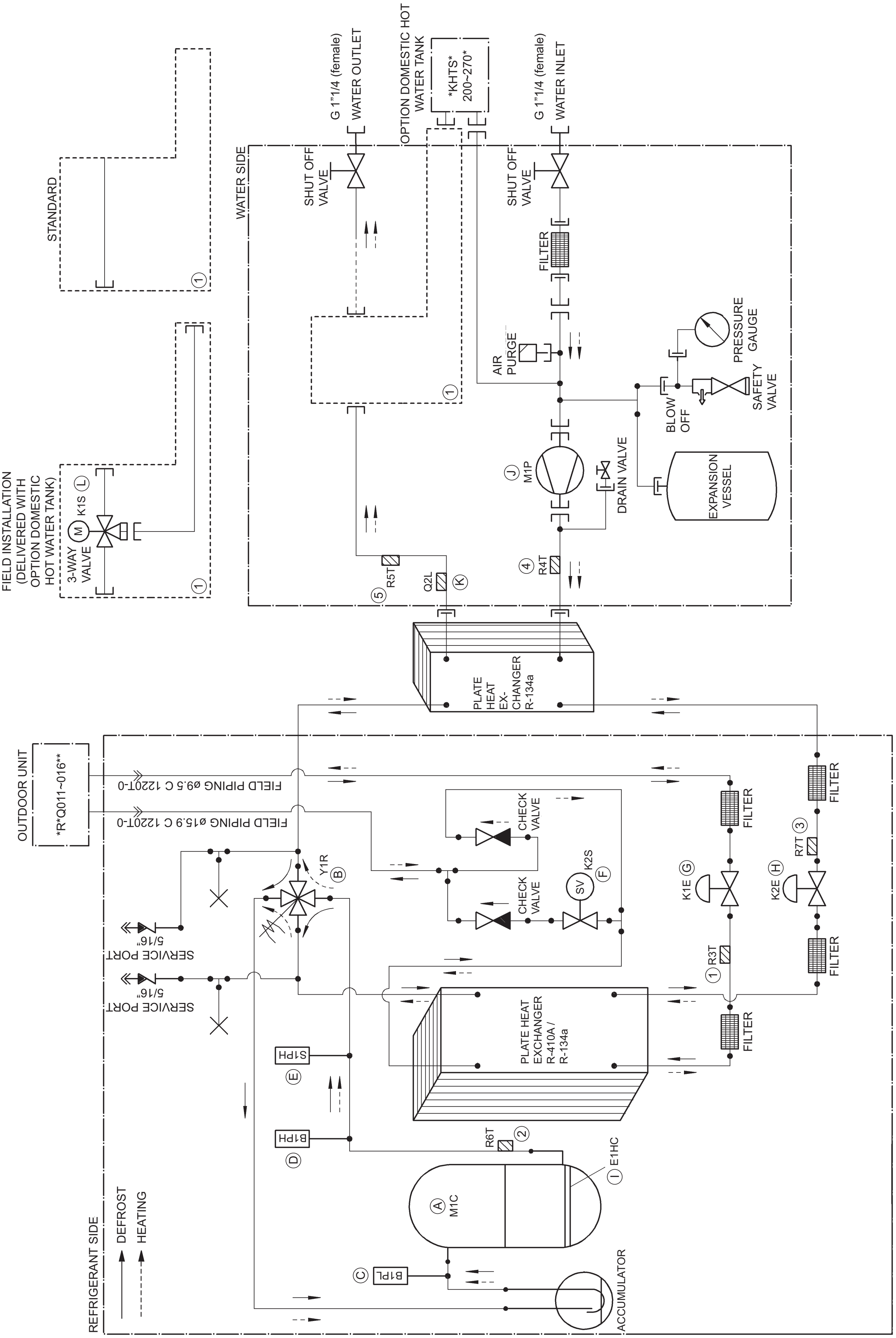

R1T
M1F
FANS
M2F
B
E
SERVICE PORT
H
HIGH PRESSURE SENSOR (S1NPH)
SP
SOLENOID VALVE (Y2S)
SV
R4T
R8T
HEAT EXCHANGER
CAPILLARY TUBE
FILTER
OIL SEPA-RATOR
FILTER
G
4-WAY VALVE (Y1S)
CAPILLARY TUBE
p >
HIGH PRESSURE SWITCH (S1PH)
J
ELECTRONIC EXPANSION VALVE (Y1E)
C
PRESSURE REGULATING VALVE
K
R3T
FILTER
SOLENOID VALVE (Y3S)
SV
F
R2T
SP
DOUBLE PIPE HEAT EXCHANGER
R6T
Low pressure sensor (S1NPL)
I
COMPRESSOR (M1C)
A
ELECTRONIC EXPANSION VALVE (Y3E)
D
R7T
R5T
ACCUMULATOR
STOP VALVE (WITH SERVICE PORT ON FIELD PIPING SIDE ø 7.9MM FLARE CONNECTION)
FILTER
HEATING
DEFROST

1.2 Indoor Unit

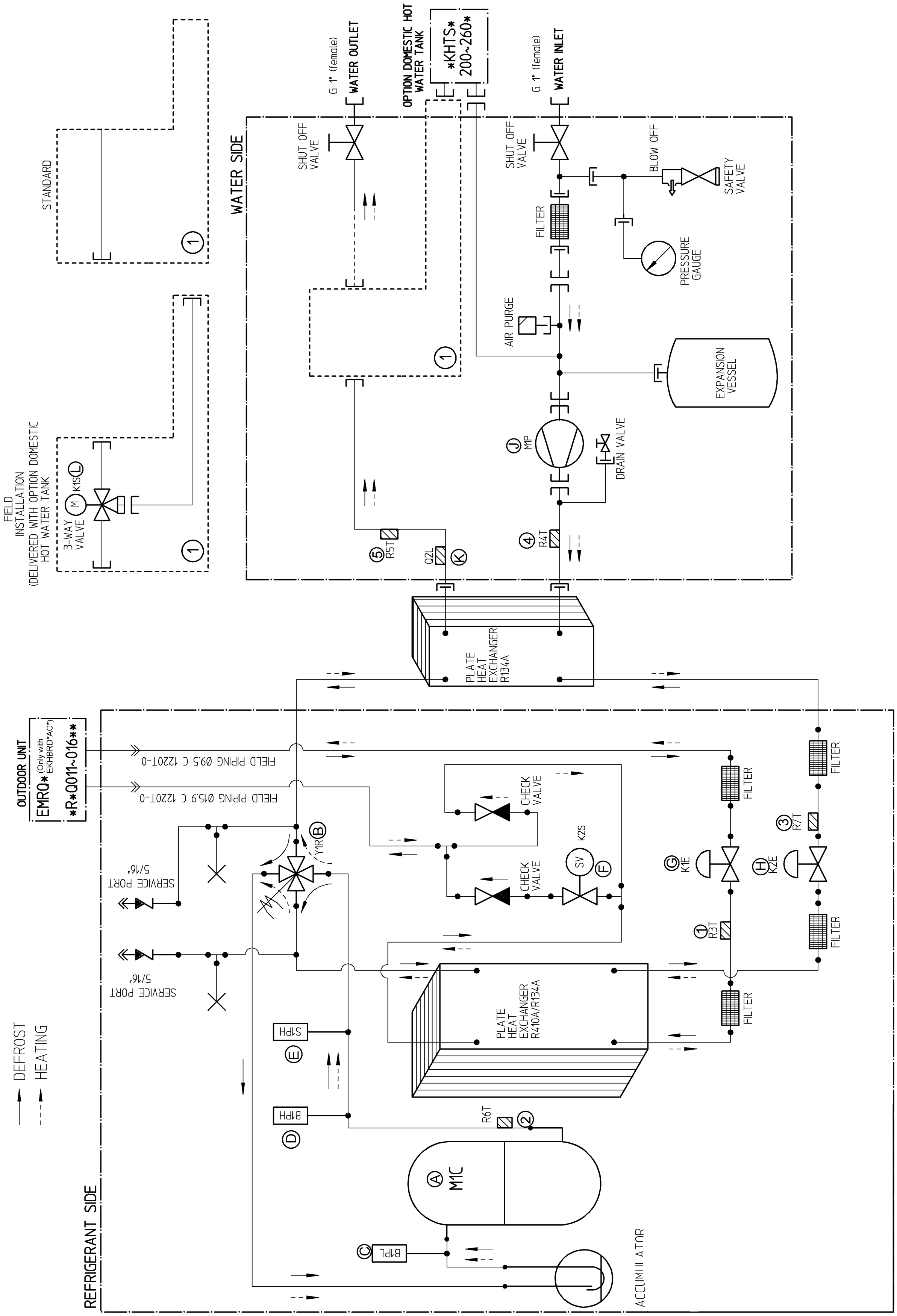
EKHBRD 011/014/016 AA/AB/AC(V1/Y1)

No. in refrigerant system diagram	Symbol	Name	Major Function
A	M1C	Inverter compressor on R-134a	Inverter compressor is operated on frequencies between 40 Hz and 210 Hz by using the inverter. Max. of 30 steps.
B	Y1R	Four way valve	Used to switch the operation mode between heating and defrost. Not activated during heating (opposite concerning outdoor unit).
C	B1PL	Low pressure sensor	Used to detect low pressure.
D	B1PH	High pressure sensor	Used to detect high pressure.
E	S1PH	High pressure switch	In order to prevent the increase of high pressure when a malfunction occurs, this switch is activated at high pressure of 3.8 MPa or more to stop the compressor operation.
F	K2S	2-way valve	Used during defrost operation.
G	K1E	Electronic expansion valve	Used to regulate the refrigerant flow of R-410A.
H	K2E	Electronic expansion valve	Used to regulate the refrigerant flow of R-134a.
I	E1HC	Crankcase heater	Used to prevent migration (when the unit is OFF) and condensation of refrigerant in the crankcase of compressor.
J	M1P	DC inverter pump	Used to regulate water flow to achieve a constant ΔT.
K	Q2L	Thermistor protector water piping	Used to protect the water system against high temperatures.
L	K1S	3 way valve (option for water tank)	Used to switch over between space heating and domestic hot water.
1	R3T	Liquid thermistor R-410A	Subcool calculation.
2	R6T	Discharge thermistor	Used to detect discharge pipe temperature, make the temperature protection control of compressor, and others.
3	R7T	Liquid thermistor R-134a	Subcool calculation.
4	R4T	Returning water thermistor	Used to control and protect the water system.
5	R5T	Leaving water thermistor	Used to control and protect the water system.

EKHBRD 011/014/016 AA(V1/Y1)



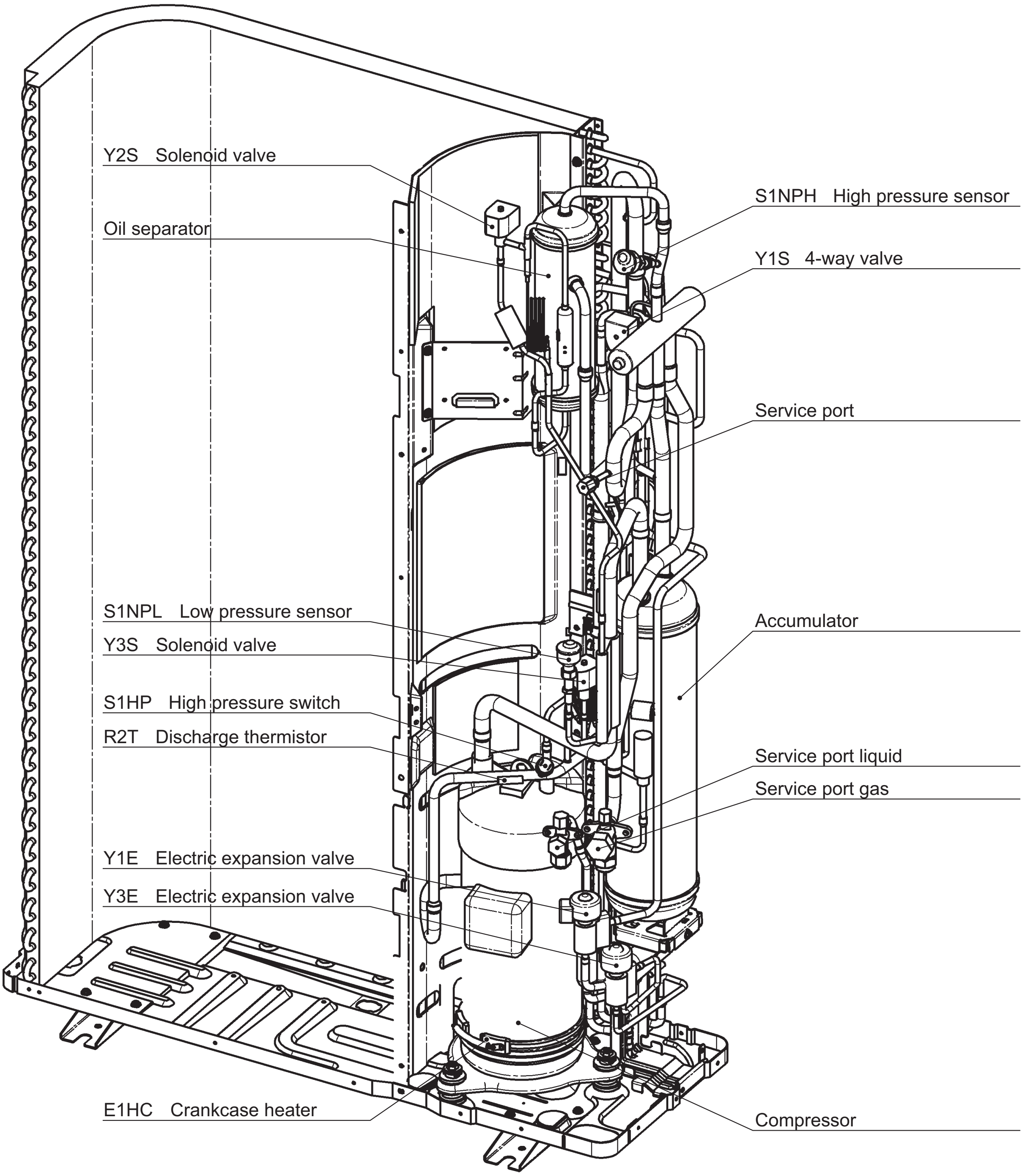
EKHBRD 011/014/016 AB/AC(V1/Y1)



2. Functional Parts Layout

2.1 ERRQ 011/014/016 AAV1, ERSQ 011/014/016 AAV1

Bird’s-eye view

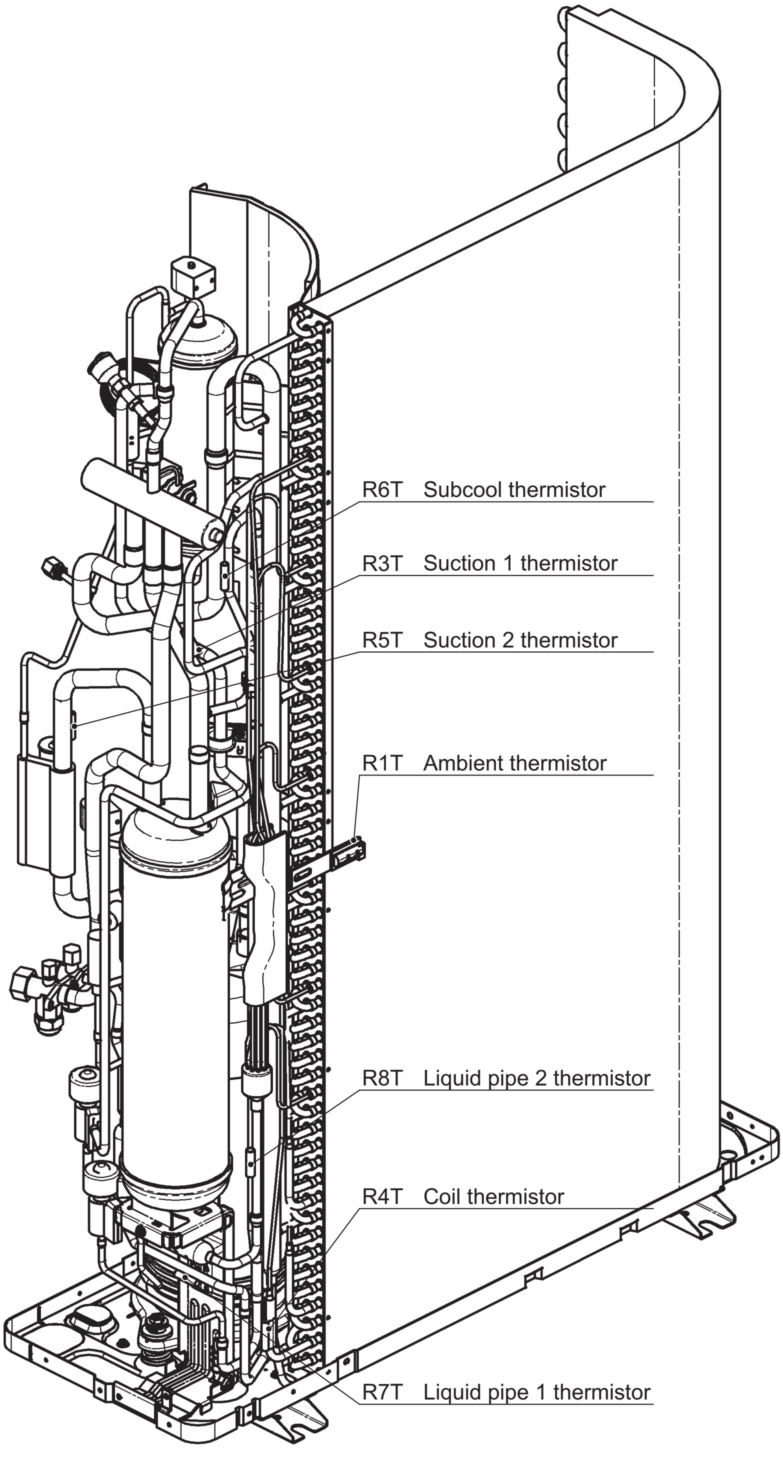


Remark:

Bottom plate heater:

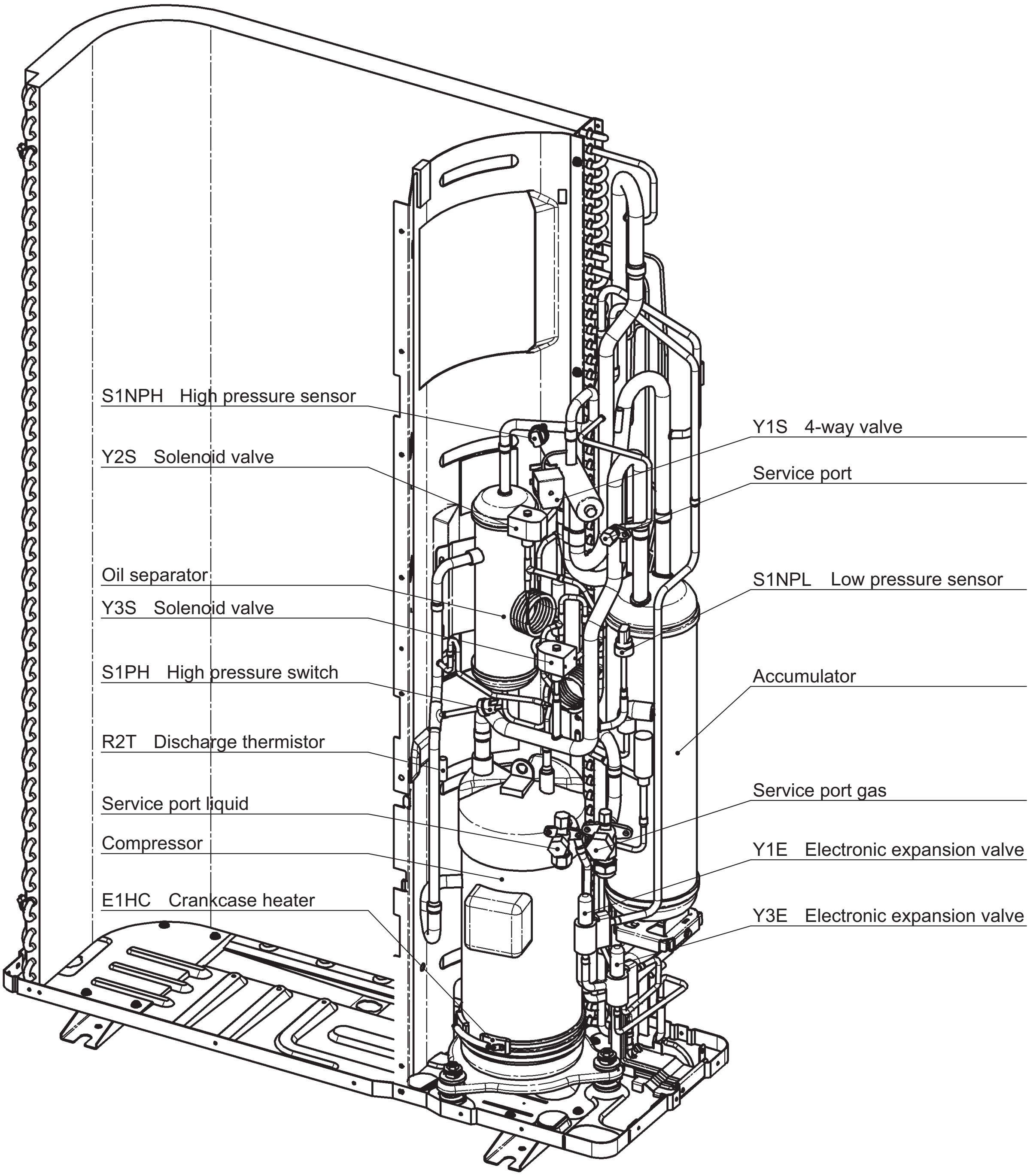
- Standard for ERRQ
- Optional for ERSQ

Back view


R6T Subcool thermistor
R3T Suction 1 thermistor
R5T Suction 2 thermistor
R1T Ambient thermistor
R8T Liquid pipe 2 thermistor
R4T Coil thermistor
R7T Liquid pipe 1 thermistor

2.2 ERRQ 011/014/016 AAY1, ERSQ 011/014/016 AAY1

Bird's-eye view

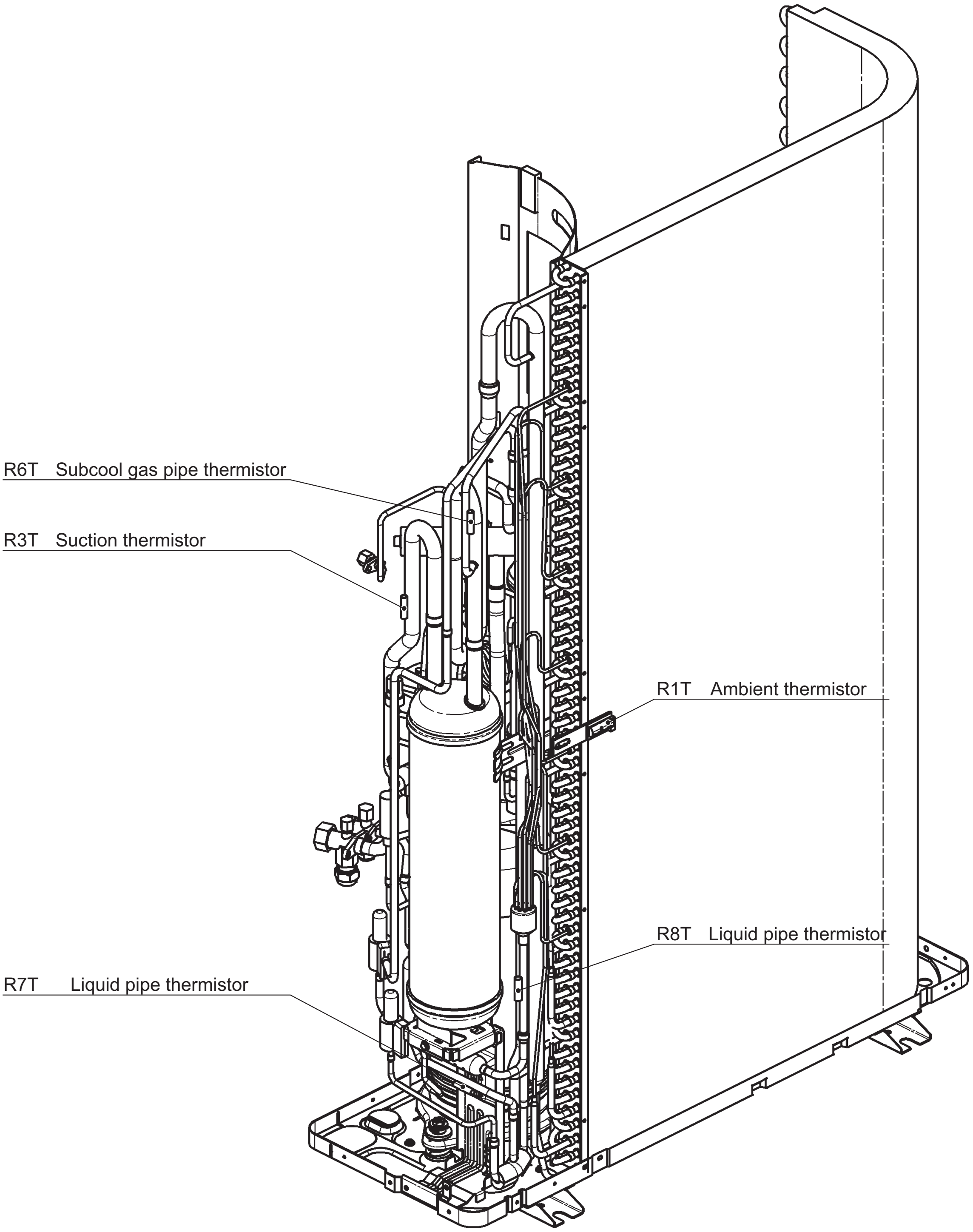


Remark:

Bottom plate heater:

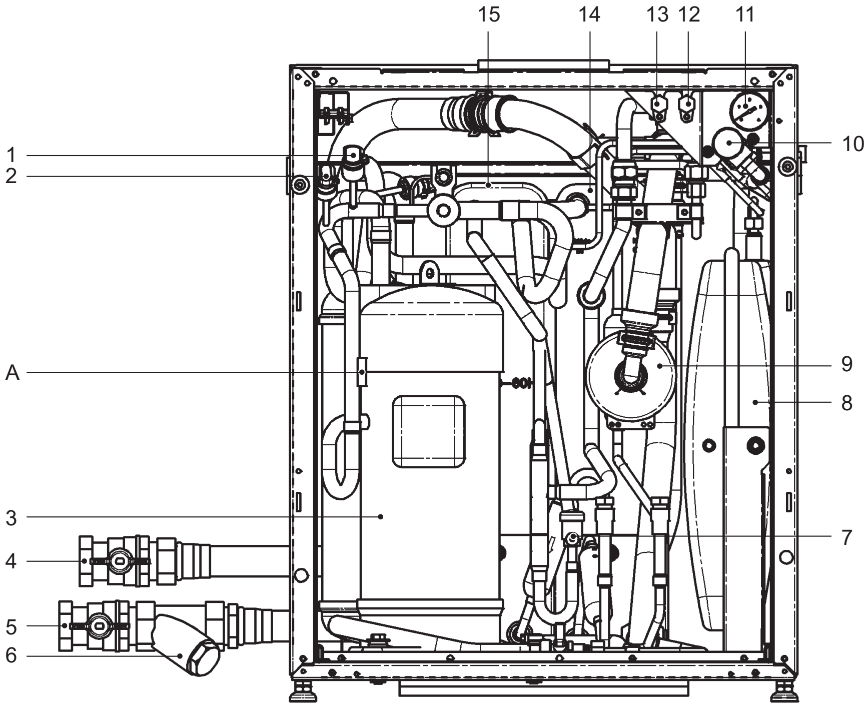
- Standard for ERRQ
- Optional for ERSQ

Back view

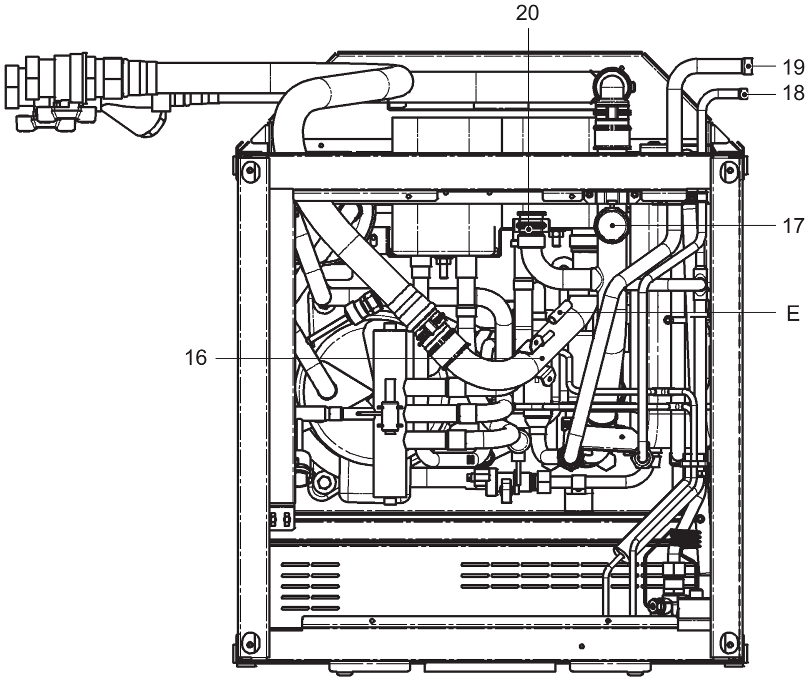

R6T Subcool gas pipe thermistor
R3T Suction thermistor
R1T Ambient thermistor
R8T Liquid pipe thermistor
R7T Liquid pipe thermistor

2.3 EKHBRD 011/014/016 AA(V1/Y1)

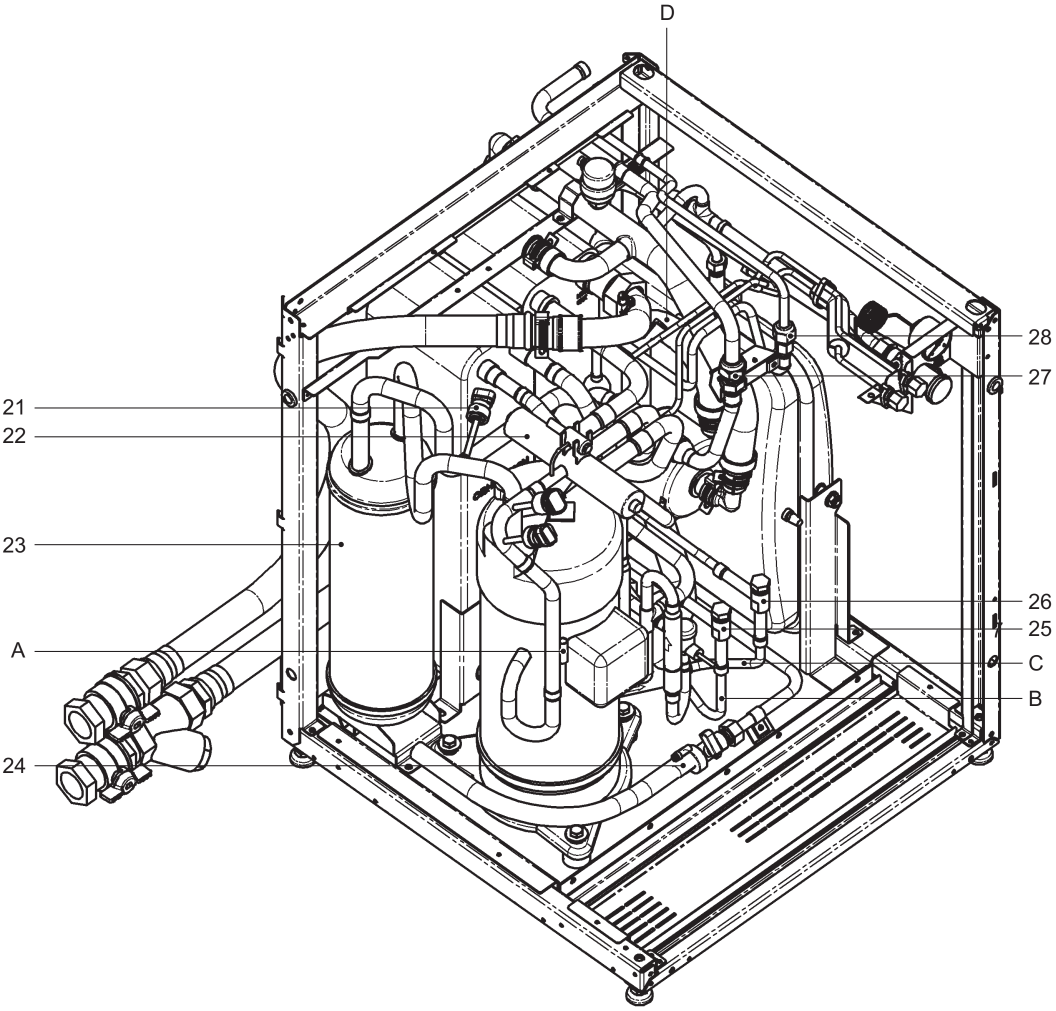
Front view



Top view



Bird’s-eye view



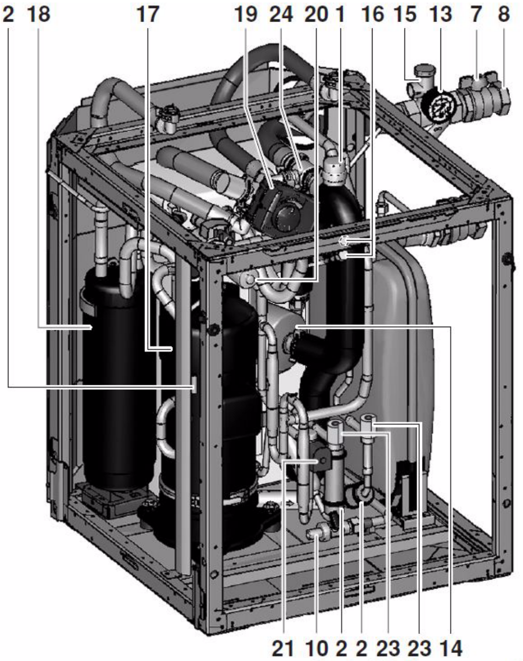
Legend

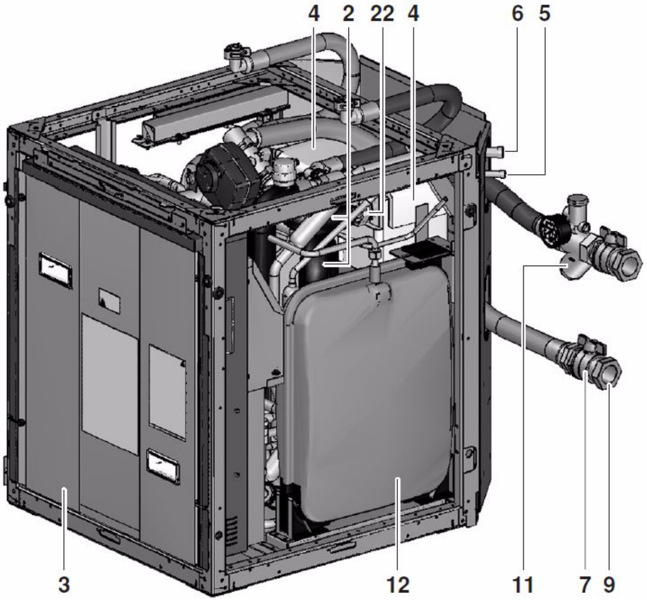
No.	Name
1	High pressure sensor
2	High pressure switch
3	Compressor R-134a
4	Outlet water connection
5	Inlet water connection
6	Filter
7	Solenoid valve
8	Expansion vessel 12 l
9	DC inverter pump
10	Pressure relief valve
11	Manometer
12	High pressure service port R-134a
13	Low pressure service port R-134a
14	Heat exchanger: refrigerant - water
15	Heat exchanger: refrigerant - refrigerant
16	(Q2L) Thermal protector water piping
17	Air purge valve

No.	Name
18	Refrigerant liquid connection R-410A
19	Refrigerant gas connection R-410A
20	Return water connection from tank
21	Low pressure sensor
22	4-way valve (R-134a)
23	Accumulator R-134a
24	Drain
25	Electronic expansion valve R-134a
26	Electronic expansion valve R-410A
27	Refrigerant gas connection R-410A
28	Refrigerant liquid connection R-410A
A	R6T Discharge thermistor
B	R7T Liquid thermistor R-134a
C	R3T Liquid thermistor R-410A
D	R4T Returning water thermistor
E	R5T Leaving water thermistor

2.4 EKHBRD 011/014/016 AB/AC(V1/Y1)

Overview



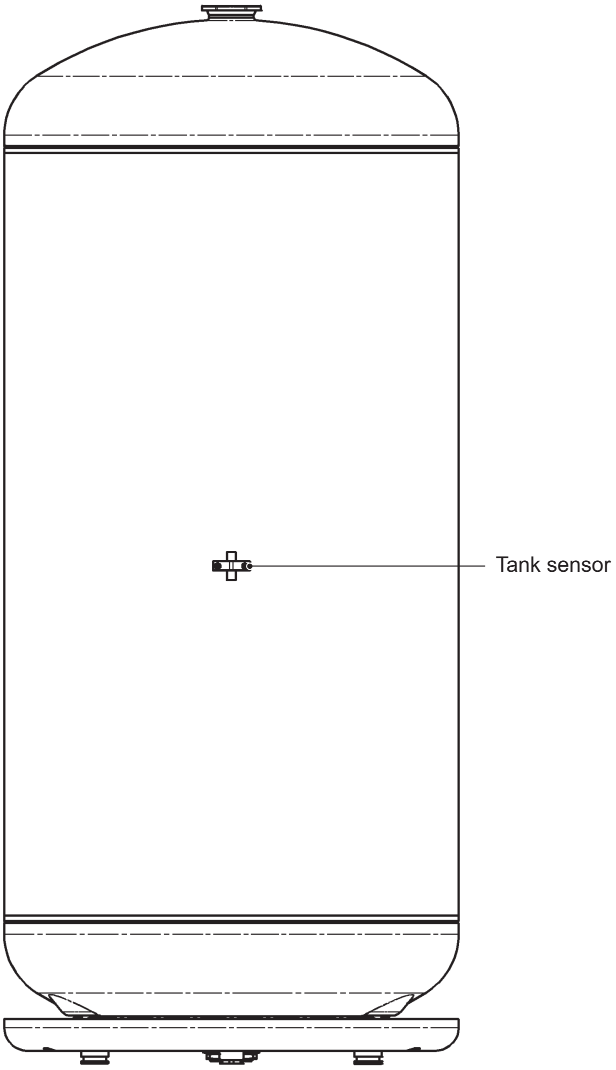


Legend

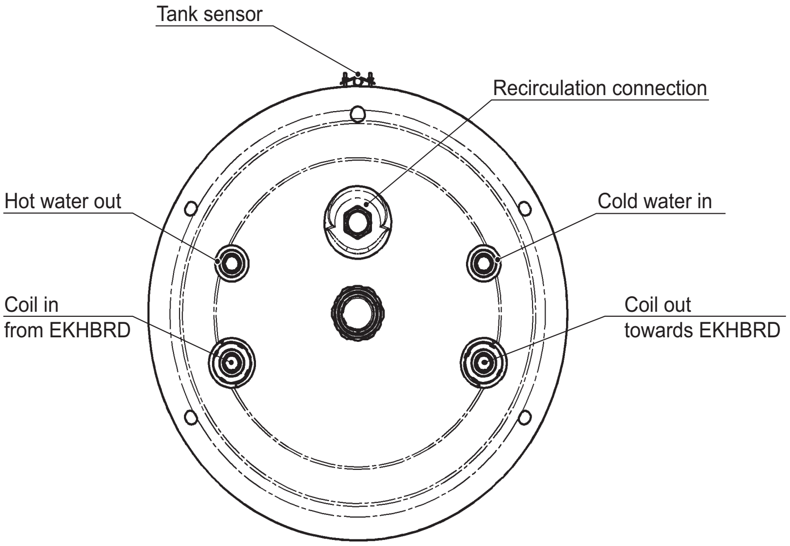
No.	Name	No.	Name
1	Air purge valve	13	Manometer
2	Thermistors	14	Pump
3	Switchbox	15	Pressure relieve valve
4	Heat exchangers	16	Service ports R134a
5	Refrigerant liquid connection R410A	17	Compressor R-134a
6	Refrigerant gas connection R410A	18	Accumulator
7	Shut-off valves	19	3-way valve (option, with EKHTS tank))
8	Water inlet connection	20	4-way valve
9	Water outlet connection	21	2-way valve
10	Drain valve	22	Thermal cut-out
11	Water filter	23	Electronic expansion valve
12	Expansion vessel (12l)	24	T-piece (option, with EKHTS tank)

2.5 EKHTS 200/260 A/AB/AC

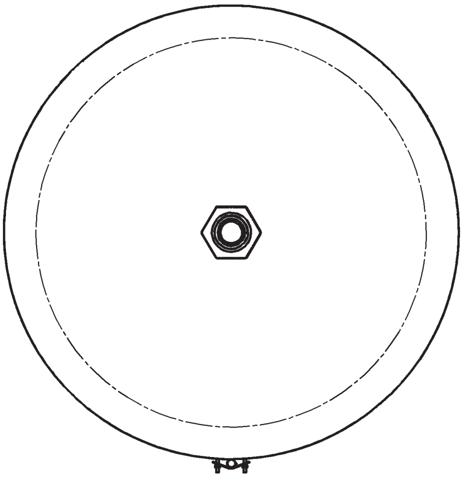
Front view



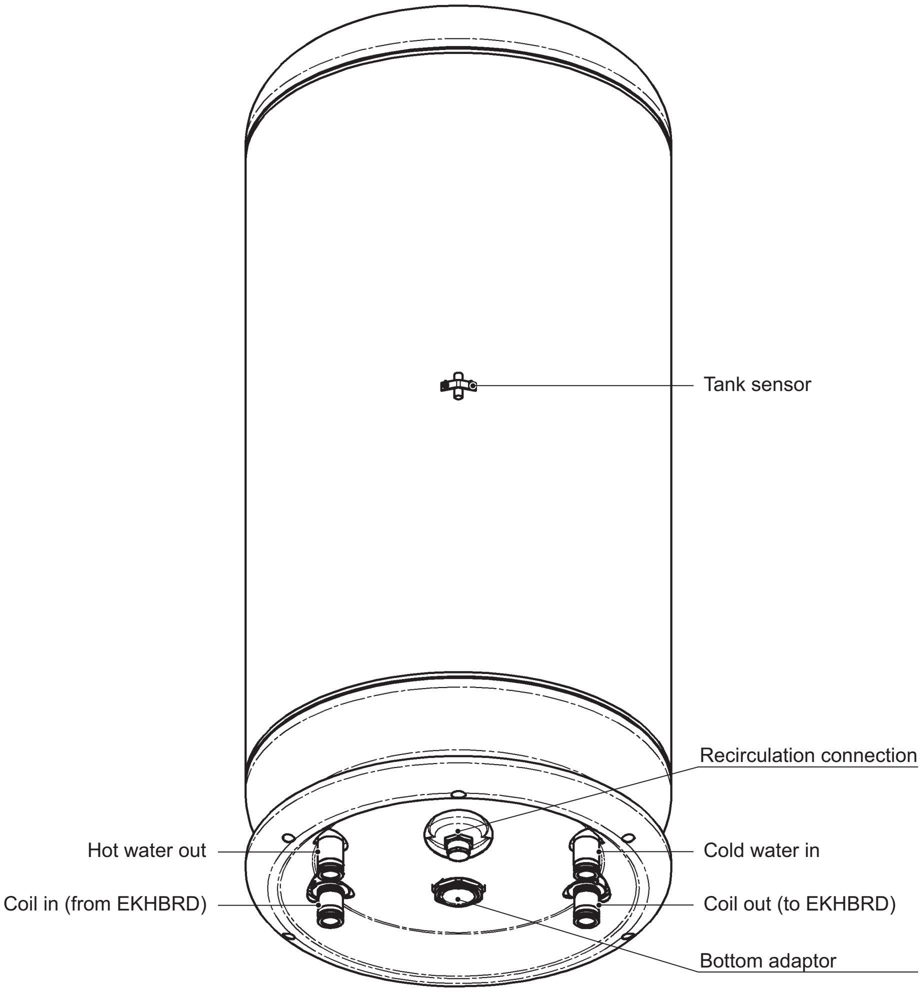
Bottom view



Top view

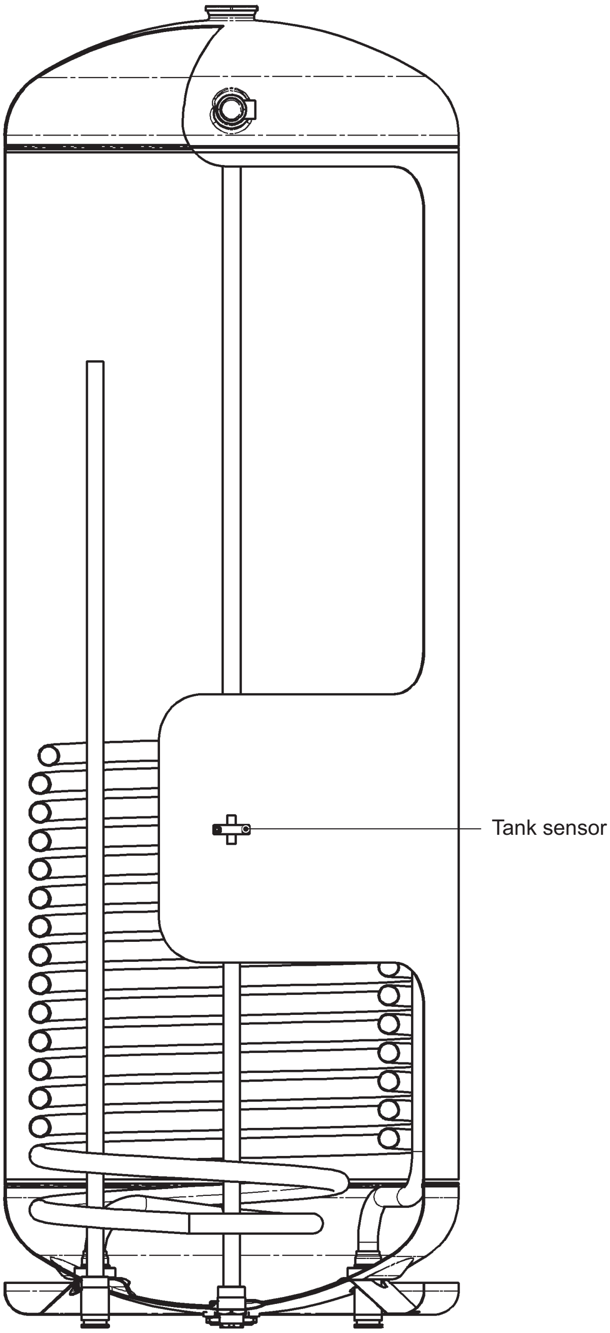


Worm's-eye view

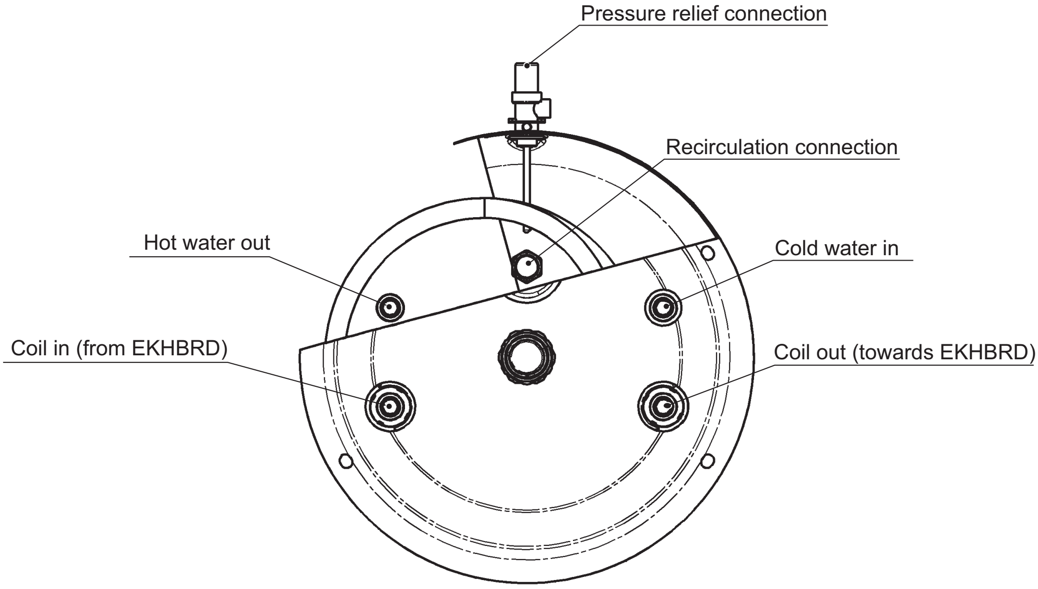


2.6 EKHTSU 200/260 A/AB/AC

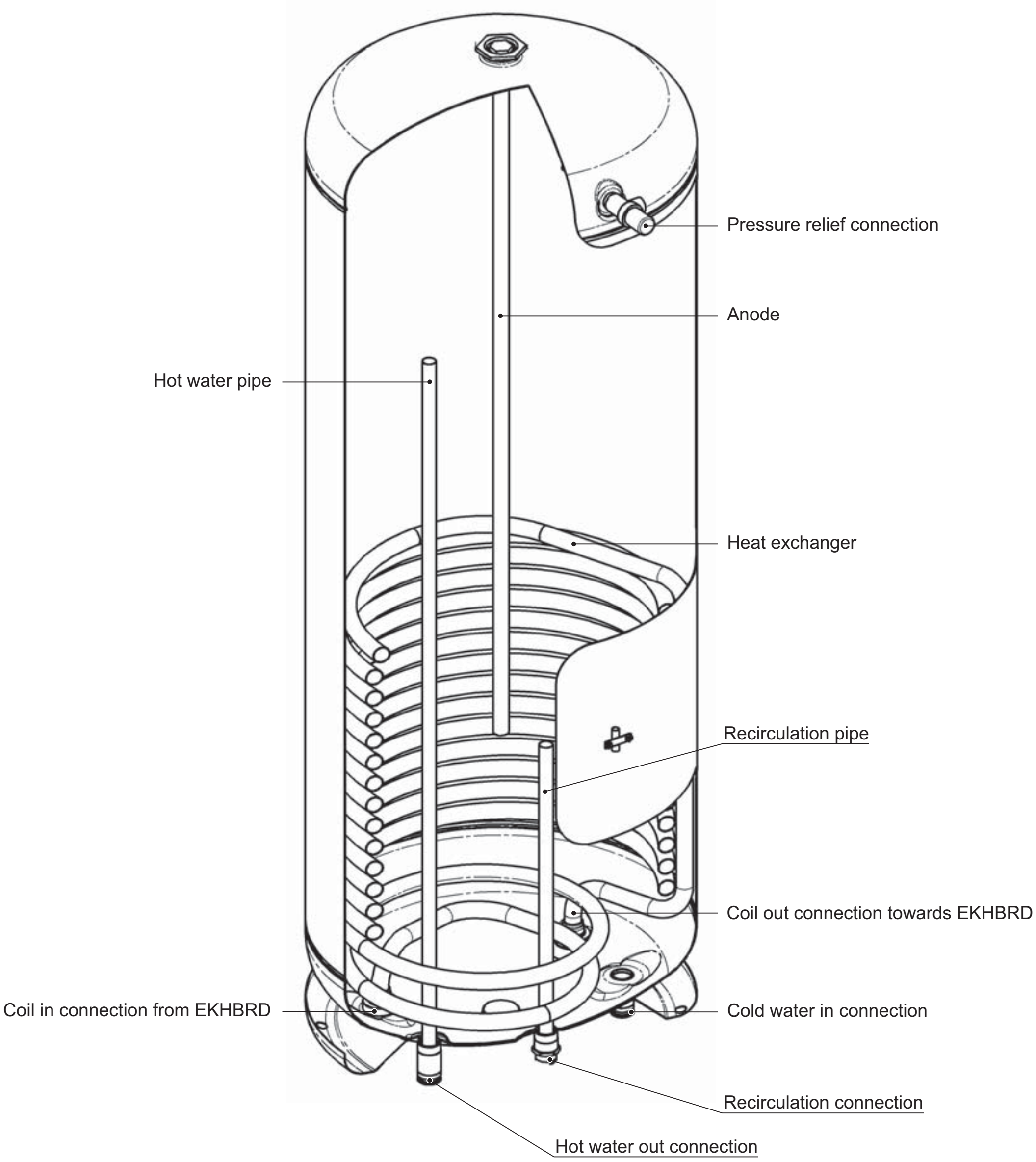
Front view



Bottom view



Bird’s-eye view



Part 4 - Electrical Circuit

1. Switch Box Layout - Indoor Unit EKHBRD 30
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    2.2 Control - PCB - A3P 36
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    2.4 Filter PCB - A6P 41
    2.5 QA PCB - A5P 43
    2.6 Inverter Control PCB - Three Phase - A4P 44
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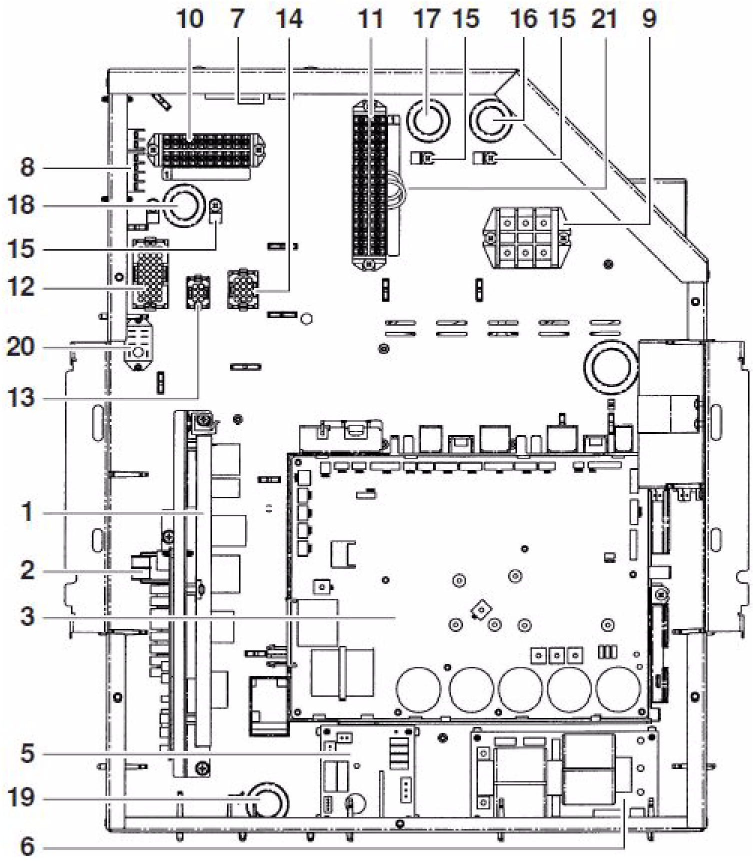
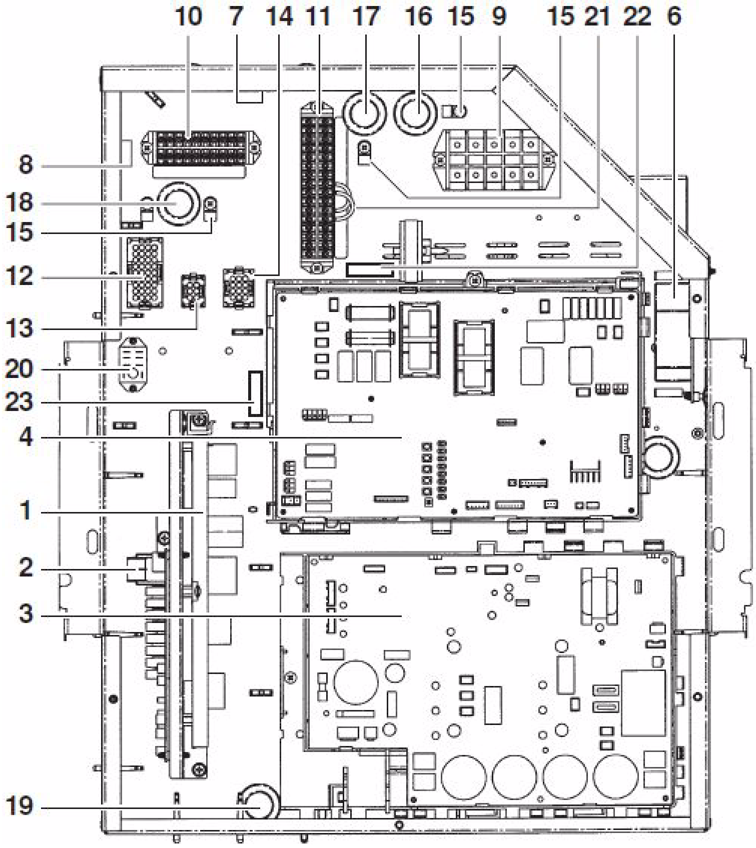
    2.8 Digital I/O PCB (Option PCB A7P) 48
    2.9 Demand PCB (Option PCB A8P) 50

1. Switch Box Layout - Indoor Unit EKHBRD

EKHBRD 011/014/016 AAV1



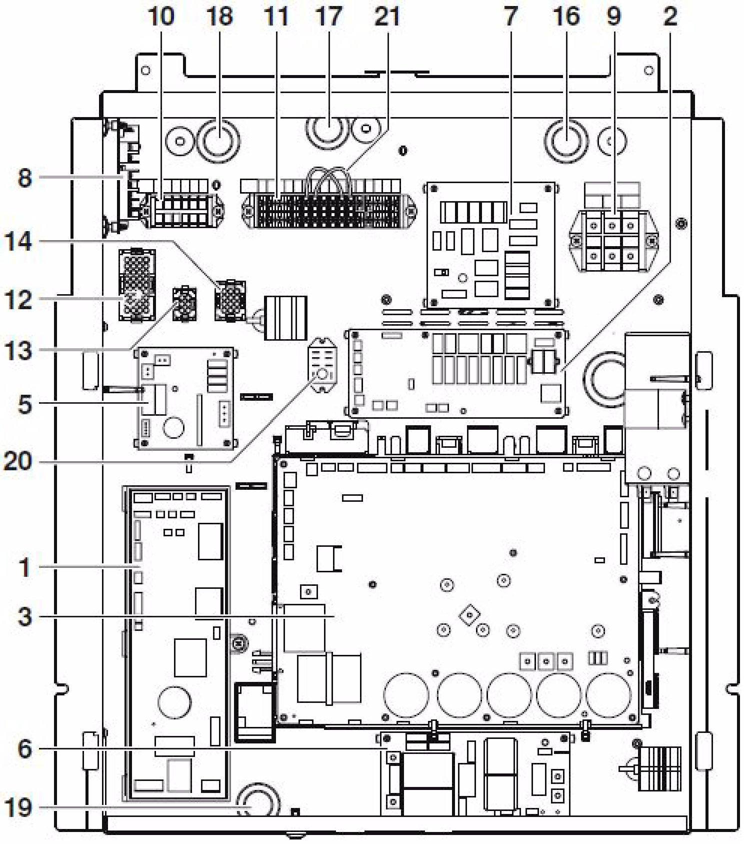
EKHBRD 011/014/016 AAY1



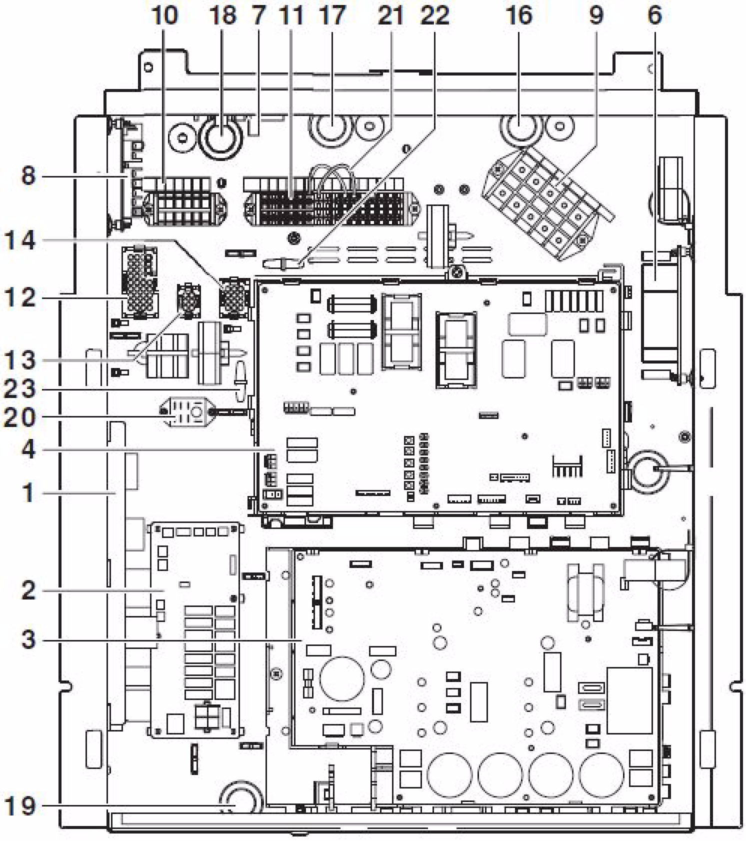
Legend

No.	Name
1	Main PCB (A1P)
2	Control PCB (A3P)
3	Inverter PCB (A5P)
4	Inverter control PCB (A4P) (only Y1)
5	QA PCB (A5P) (only V1)
6	Filter PCB (A6P)
7	Digital I/O PCB (A7P) (Optional)
8	Demand PCB (A8P) (Optional)
9	Terminal block X1M: Main power supply
10	Terminal block X2M: AC connections
11	Terminal block X3M: DC connections
12	DC connector X1Y
13	Pump connector X2Y
14	AC connectory X3Y
15	Cable tie mountings
16	Power wiring entry
17	AC field wiring entry
18	DC field wiring entry
19	Compressor cable entry
20	Interface relay K1A
21	Wiring bridges
22	Fuse F1 (Only Y1)
23	Fuse F2 (Only Y1)

EKHBRD 011/014/016 AB/AC V1



EKHBRD 011/014/016 AB/AC Y1



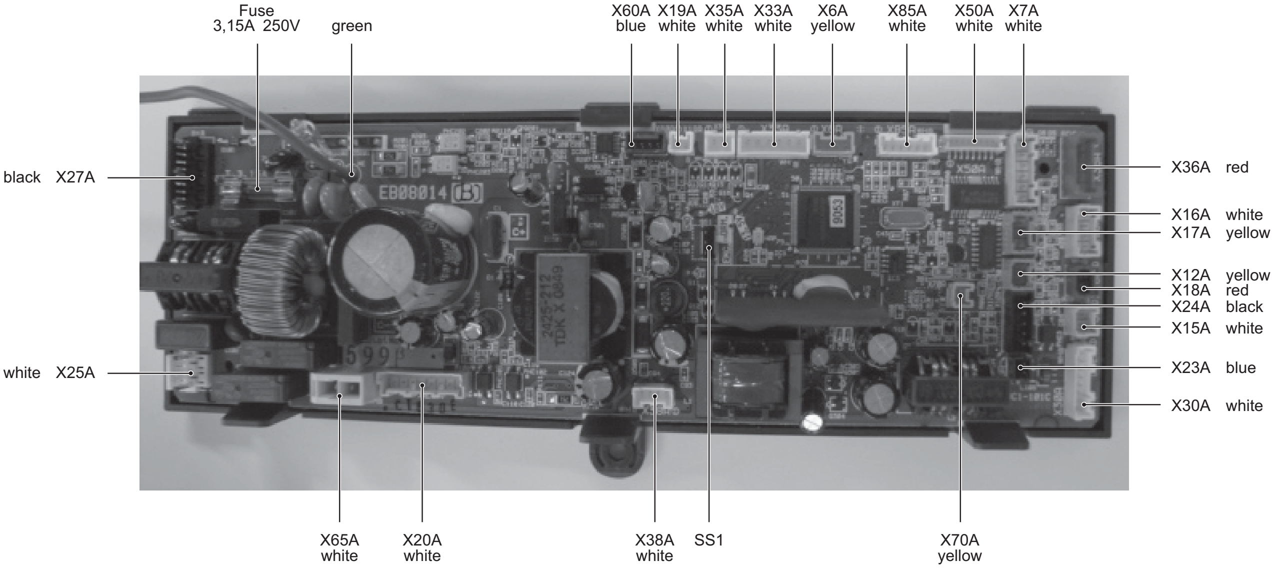
Legend

No.	Name
1	Main PCB (A1P)
2	Control PCB (A3P)
3	Inverter PCB (A5P)
4	Inverter control PCB (A4P) (only Y1)
5	QA PCB (A5P) (only V1)
6	Filter PCB (A6P)
7	Digital I/O PCB (A7P) (Optional)
8	Demand PCB (A8P) (Optional)
9	Terminal block X1M: Main power supply
10	Terminal block X3M: DC connections
11	Terminal block X2M: AC connections
12	DC connector X1Y
13	Pump connector X2Y
14	AC connectory X3Y
15	Cable tie mountings
16	Power wiring entry
17	AC field wiring entry
18	DC field wiring entry
19	Compressor cable entry
20	Interface relay K1A
21	Wiring bridges
22	Fuse F1 (Only Y1)
23	Fuse F2 (Only Y1)

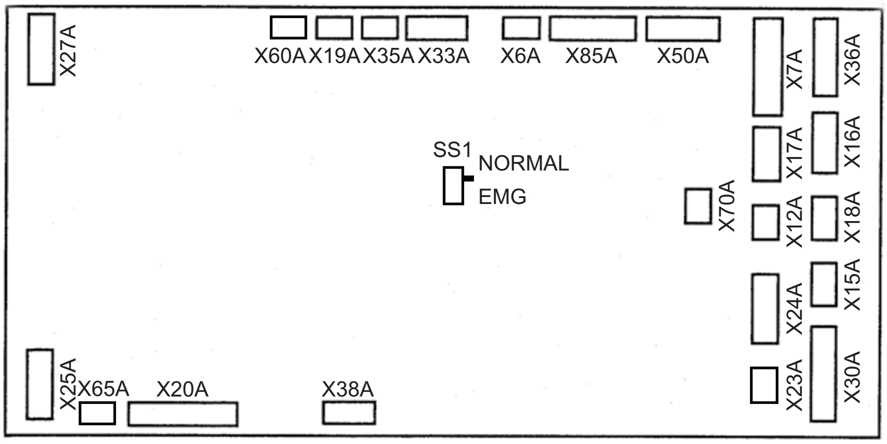
2. PCB Layout for EKHBRD 011/014/016 AA/AB/AC V1/Y1

2.1 Main PCB - A1P

Main PCB - single phase



Main PCB - A1P



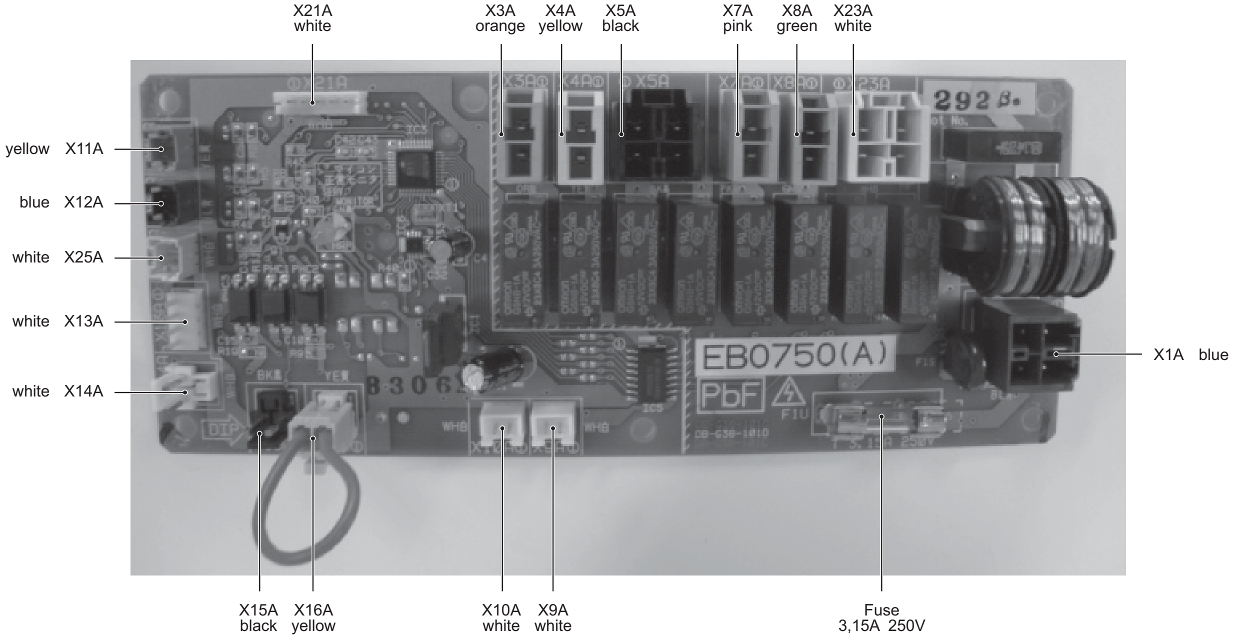
Legend

Connector	Connected to	Color
SS1	Emergency switch	
X6A	-	Yellow
X7A	K1E: electronic expansion valve	White
X12A	R4T: returning water thermistor	Yellow
X15A	-	White
X16A	-	White
X17A	R5T: leaving water thermistor	Yellow
X18A	R3T: liquid thermistor R-410A	Red
X19A	-	White
X20A	M1P: DC inverter pump	White
X23A	-	Blue
X24A	-	Black
X25A	-	White
X27A	X803A of PCB A5P	Black
X30A	X3M [3; 4 -> F_1 F_2] [7; 8 -> P_1 P_2]	White
X33A	X2A of PCB A7P*	White
X35A	X10A of PCB A3P	White
X36A	-	Red
X38A	-	White
X50A	-	White
X60A	-	Blue
X65A	-	White
X70A	X15A of PCB A3P	Yellow
X85A	X80A of PCB A8P*	White

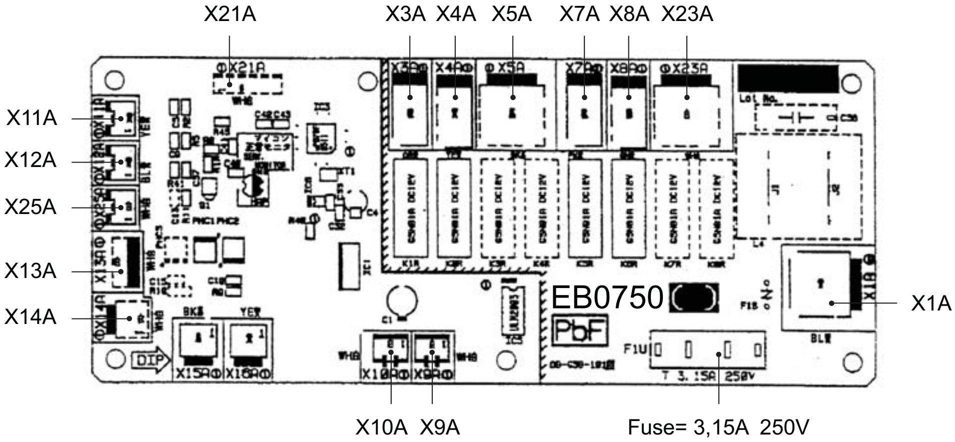
*: A7P, A8P= option PCB; connection not standard

2.2 Control - PCB - A3P

Control PCB - single phase



Control PCB - A3P



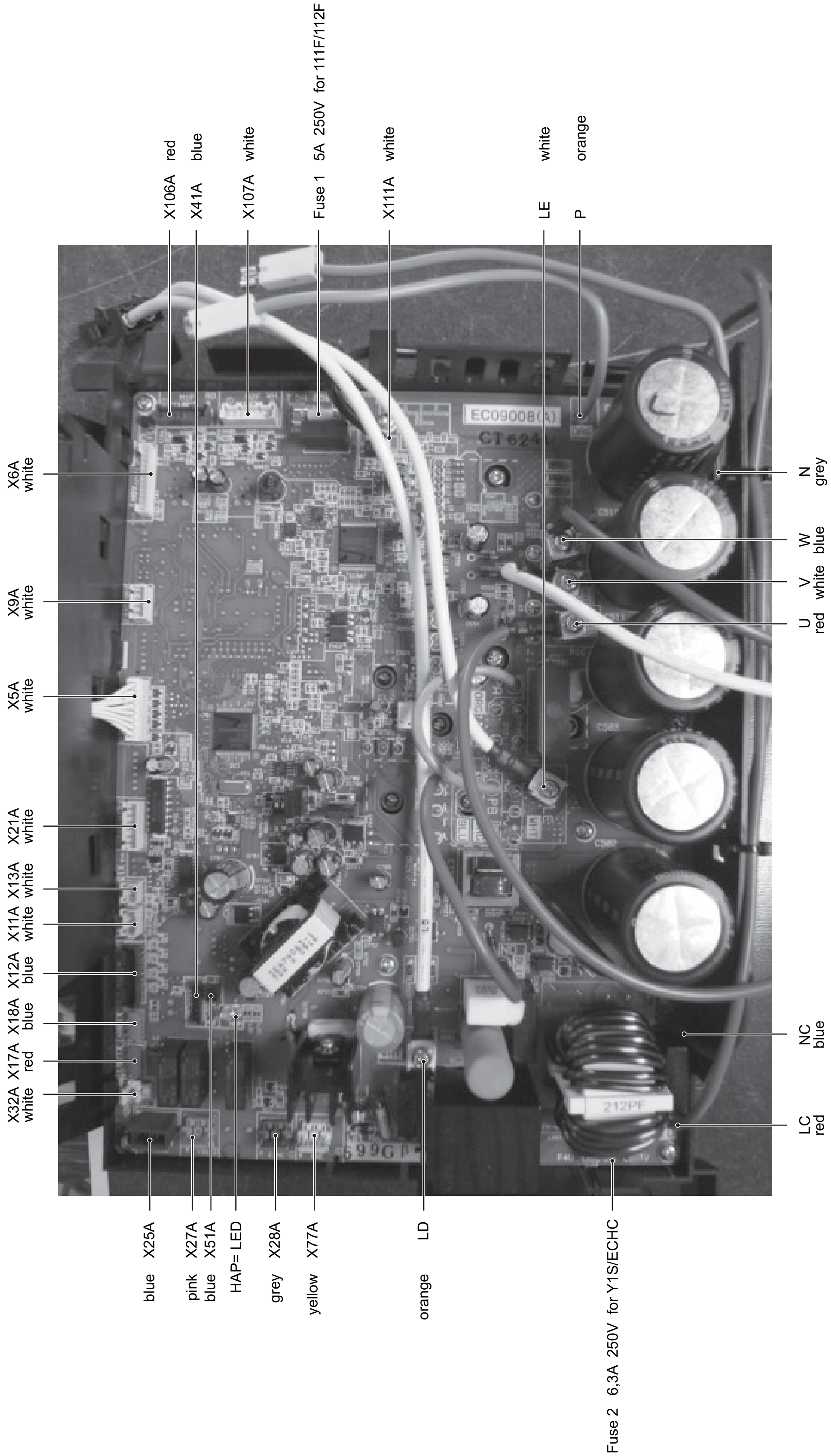
Legend

Connector	Color	Connected to
X1A	Blue	-
X3A	Orange	X2M [12 - 13]
X4A	Yellow	-
X5A	Black	X2M [3 - 4]
X7A	Pink	2-way valve (R-410A)
X8A	Green	Bridge with filter capacitors
X9A	White	-
X10A	White	X35A of PCB A1P -> 16V power supply
X11A	Yellow	R2T*1
X12A	Blue	-
X13A	White	-
X14A	White	X3M [7 - 8]*2
X15A	Black	X15A of PCB A1P
X16A	Yellow	Bridge
X21A	White	-
X23A	White	X2M [14 - 15 -16]
X25A	White	-

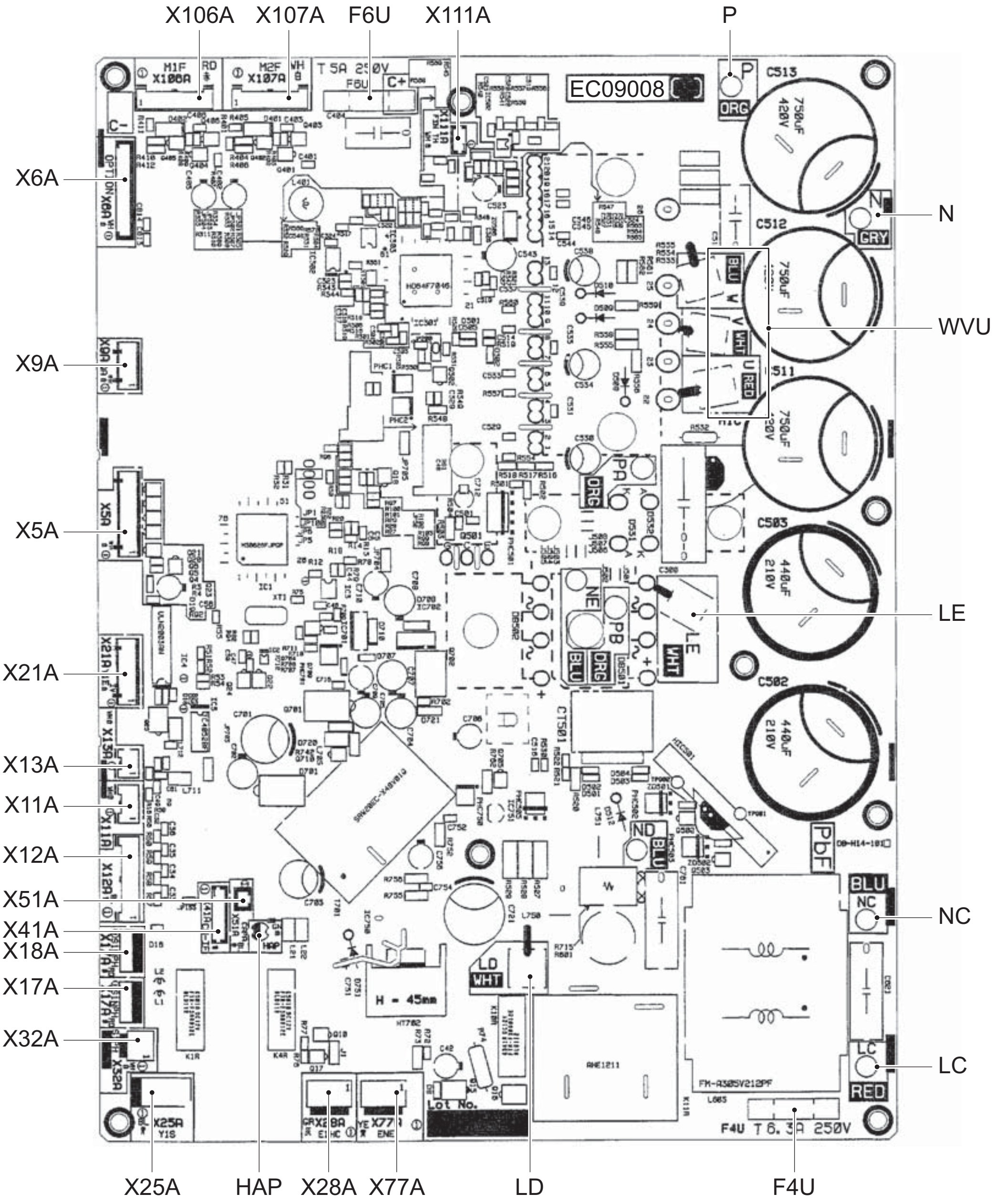
*1: Only for EKHTS
*2: Only for benefit kWh rate power supply installation

2.3 Inverter PCB - A4P

Inverter PCB - single phase



Inverter PCB



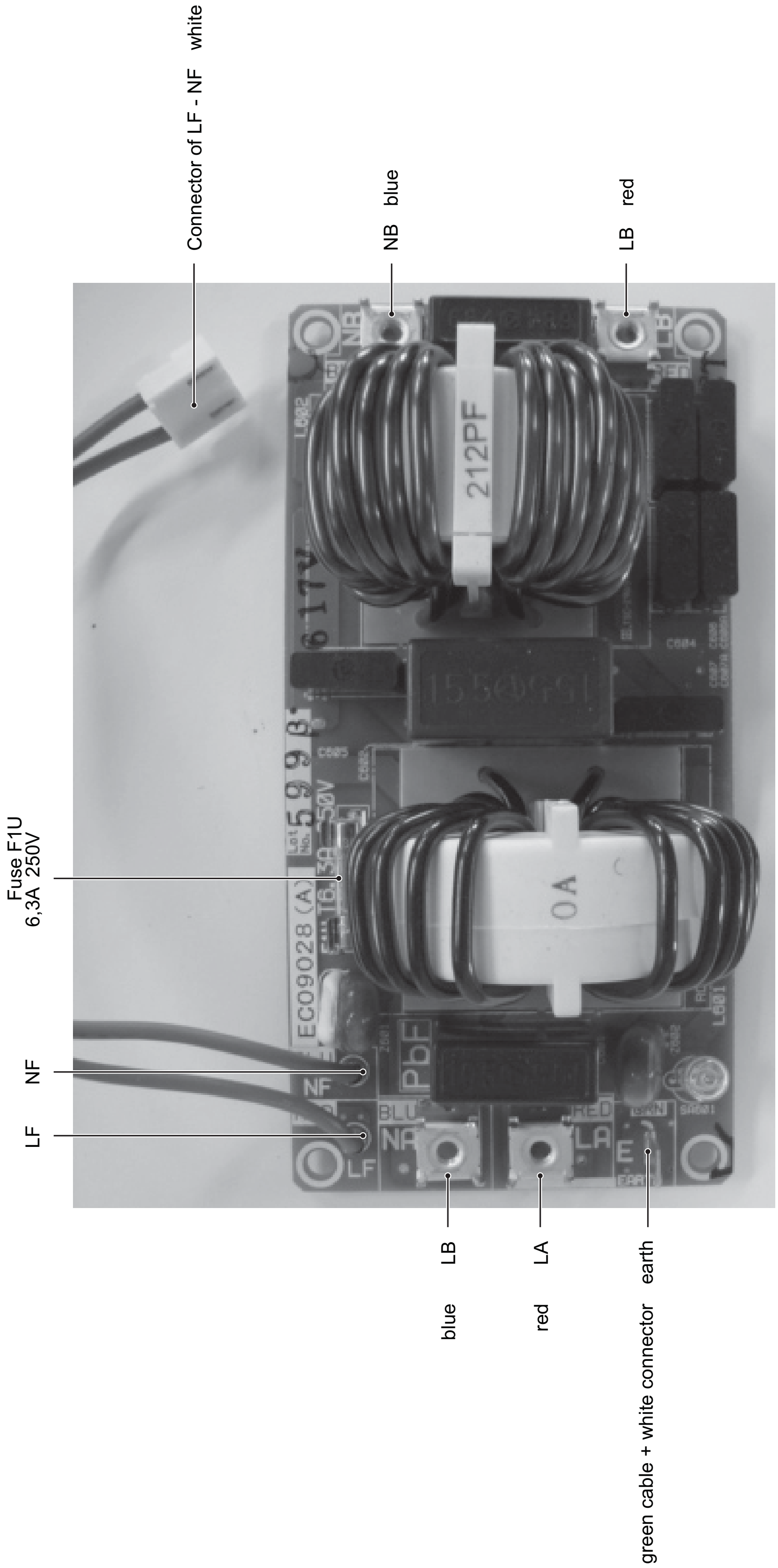
Legend

Connector	Color	Connected to	Function
X5A	White	-	-
X6A	White	-	-
X9A	White	X809A of PCB A5P	QA PCB
X11A	White	-	-
X12A	Blue	R6T by connector X1Y [13, 14] R7T by connector X1Y [15, 16]	Discharge & liquid [R-134a] thermistor
X13A	White	-	-
X17A	Red	B1PH by connector X1Y [17, 18, 19]	High pressure sensor
X18A	Blue	B1PL by connector X1Y [20 - 21 - 22]	Low pressure sensor
X21A	White	K2E by connector X1Y [25 - 26 - 27 - 28 - 29 - 30]	Electronic expansion valve
X25A	Blue	Y1R by connector X3Y [7 - 8]	4-way valve
X27A	Pink	M1F & M2F	Switch box cooling fan
X28A	Grey	E1HC by connector X3Y [5 - 6]	Crankcase heater
X32A	White	K1A	Interface relay of S1PH & Q2L
X41A	Blue	-	Service purpose

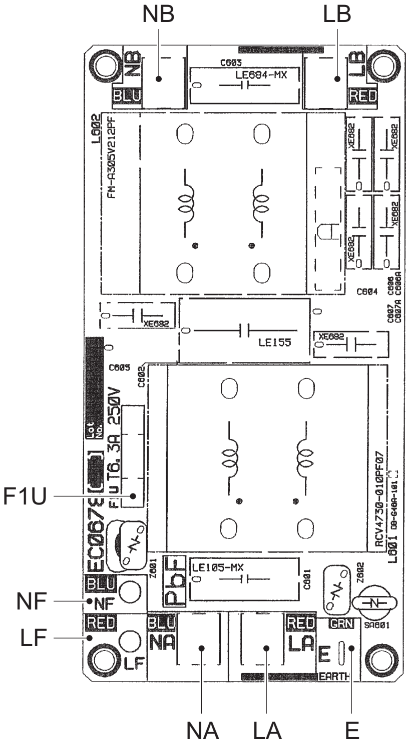
X51A	Blue	-	-
X77A	Yellow	K1A & connector X3Y [9, 10]	Interface relay of S1PH & Q2L
X106A	Red	-	-
X107A	White	-	-
X111A	White	R8T	Fin thermistor
HAP	LED	-	Indication power supply
Fuse 1	-	-	5A, 250V for M1F, M2F
Fuse 2	-	-	6,3A, 250V for Y1S, ECHC
LC	Red	LB of PCB A6P	Filter PCB
LD	Orange	R1L by connector X4Y [1, 2]	Reactor
LE	White		
NC	Blue	NB of PCB A6P	-
N	Grey	C1-	Capacitor C1
P	Orange	C1+	
U	Red	U of M1C	Compressor
V	White	V of M1C	
W	Blue	W of M1C	

2.4 Filter PCB - A6P

Filter PCB - single phase



Filter PCB - A6P

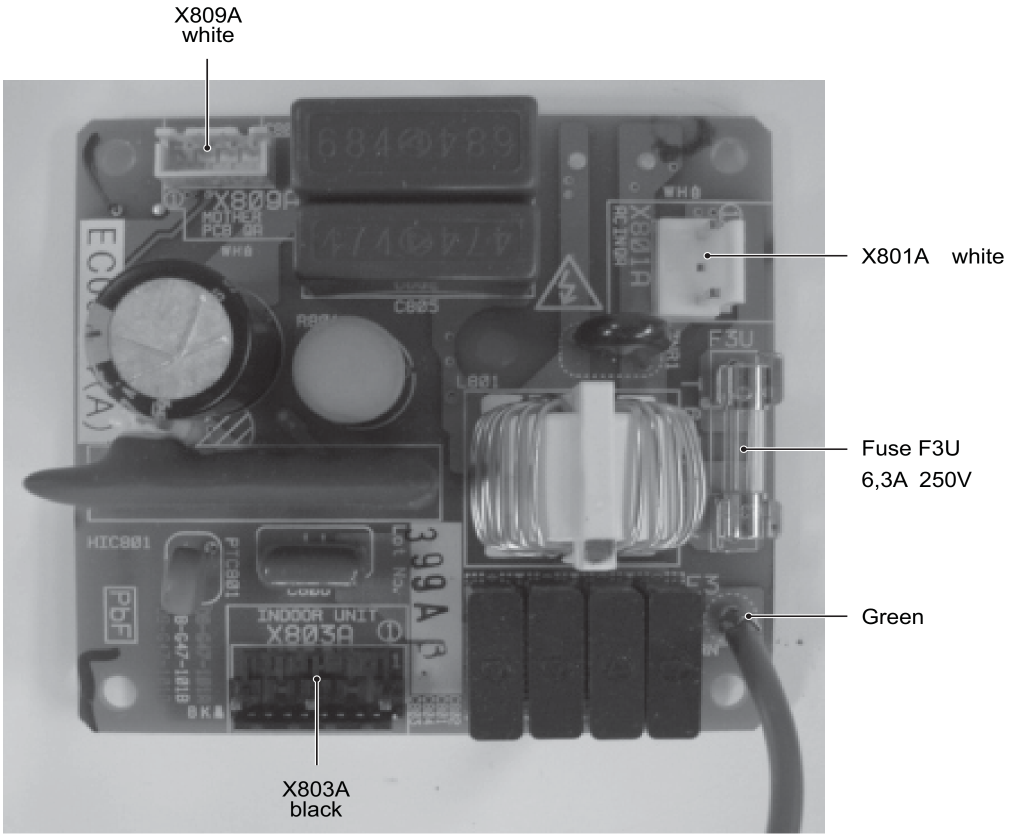


Legend

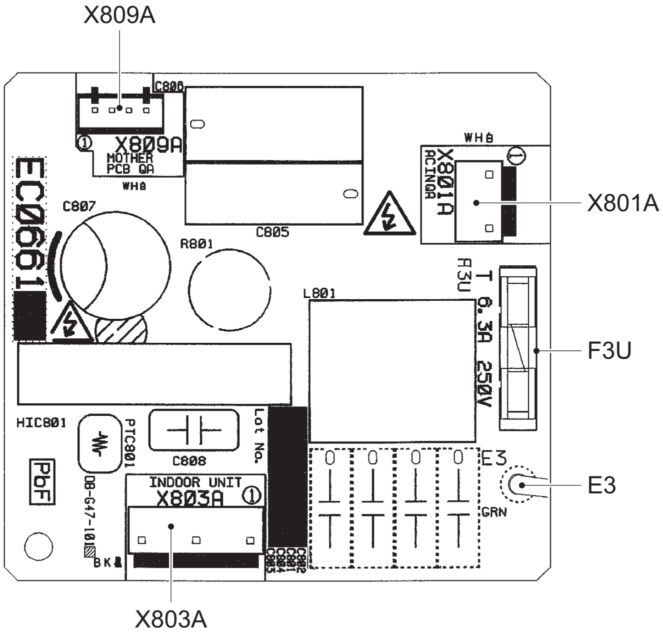
Connector	Color	Connected to - function
LA	Red	X1M [L - N] Power supply 1~230V
NA	Blue	
LB	Red	LC - NC Inverter PCB
NB	Blue	
LF	Red	X2M [10 - 11] via V5C
NF	Blue	
E	Green cable, white connector	Earth
F1U	-	6,3A 250V [fuse]

2.5 QA PCB - A5P

QA PCB - single phase



QA PCB - A5P

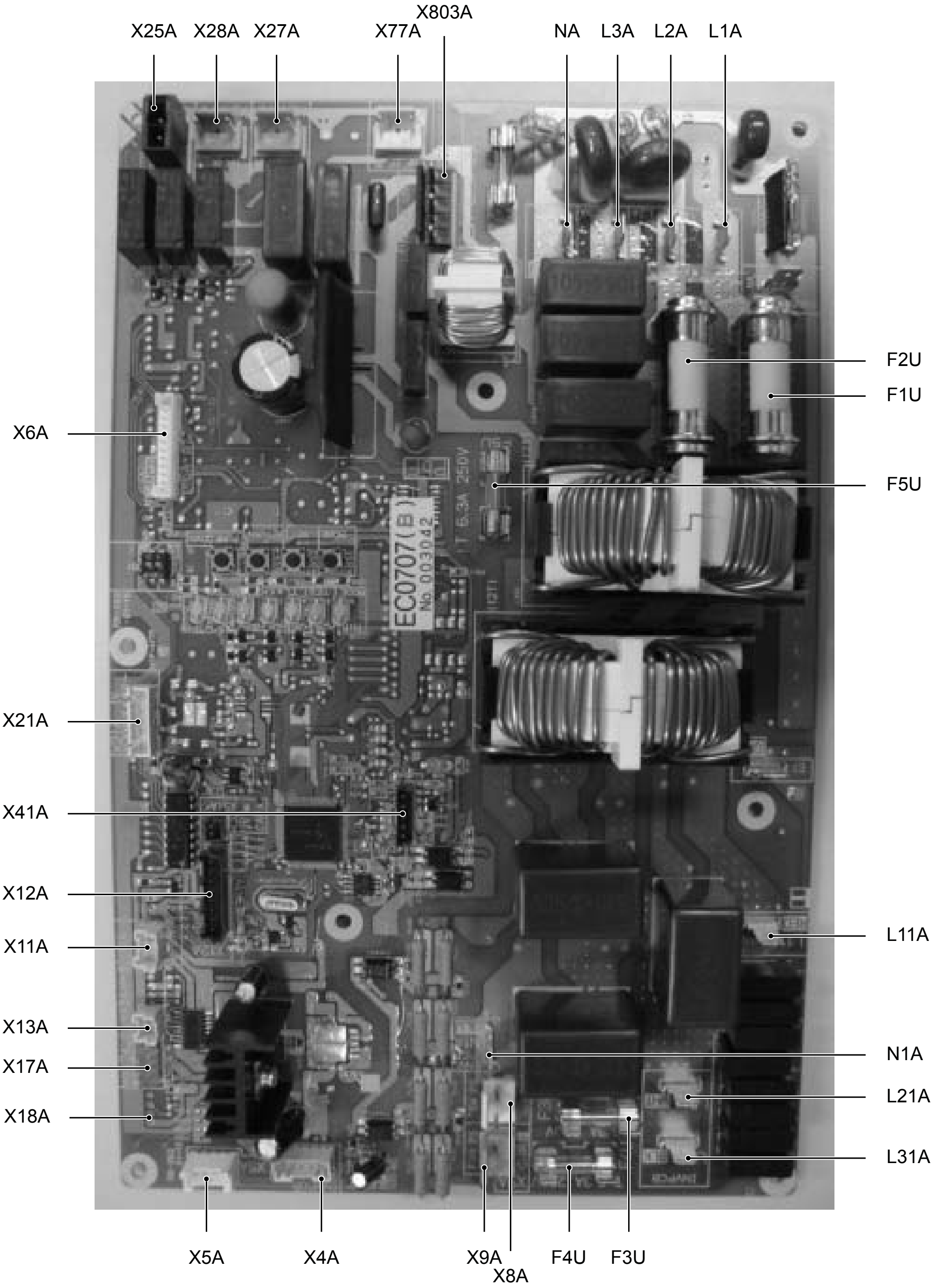


Legend

Connector	Color	Connected to - function
X801A	White	X2M [8 - 9] by V5C
X803A	Black	X27A of main PCB A1P
X809A	White	X9A of invertor PCB A4P
F3U	-	Fuse 6,3A / 250V
E3	Green	Earth

2.6 Inverter Control PCB - Three Phase - A4P

Inverter control PCB - three phase

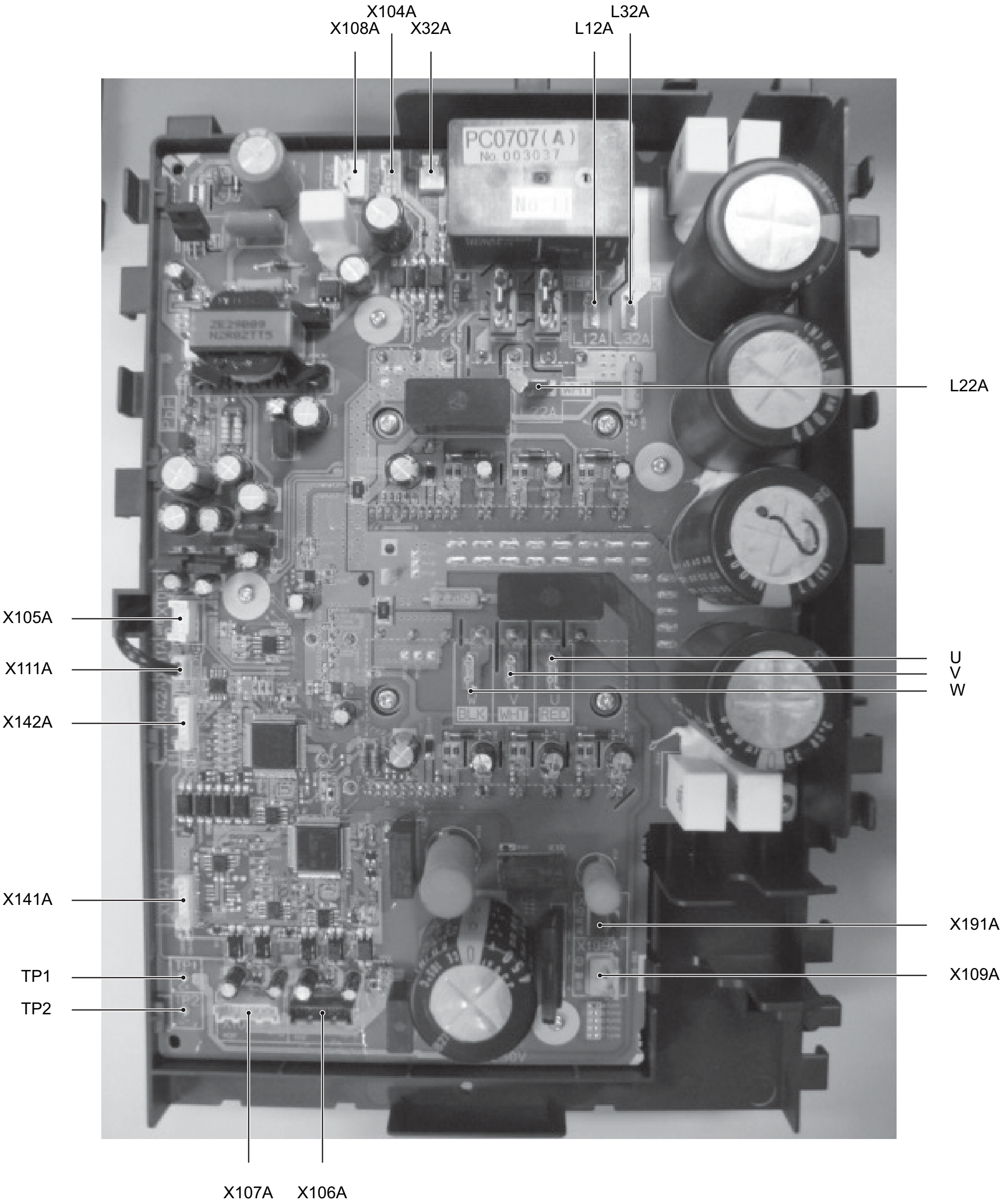


Legend

Connector	Color	Connected to - function
L1A	-	Phase L1
L2A	-	Phase L2
L3A	-	Phase L3
NA	-	Phase N
L11A	-	L11B - filter PCB
L12A	-	L21B - filter PCB
L13A	-	L31B - filter PCB
N1A	-	N1B - filter PCB
X4A	Ivory	Inverter PCB X104A
X5A	White	Inverter PCB X105A
X6A	White	-
X8A	White	Inverter PCB X108A
X9A	Orange	Inverter PCB X109A
X11A	Ivory	R1T
X12A	Blue	R2T, R3T, R4T and R5T
X13A	Ivory	R6T
X17A	Red	S1NPH
X18A	Blue	S1NPL
X21A	Ivory	EV - Y1E
X25A	Blue	Y1S
X27A	Pink	Y3S
X28A	Grey	E1HC
X41A	Blue	-
X77A	Yellow	ENE - 200V
X803A	Black	-
F1U, F2U	-	Fuse 31,5A - 250V
F3U, F4U	-	Fuse 6,3A - 250V
F5U	-	Fuse 6,3A - 250V

2.7 Inverter PCB - Three Phase - A5P

Inverter PCB - three phase

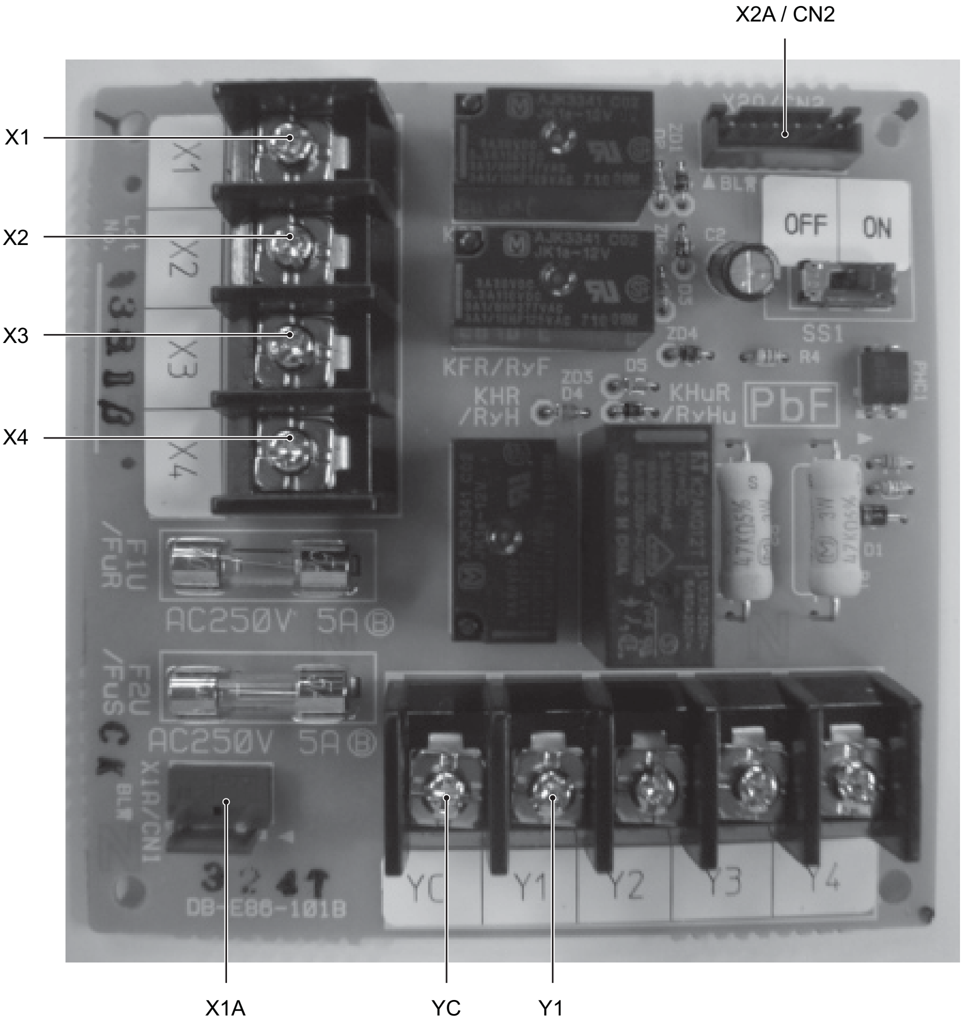


Legend

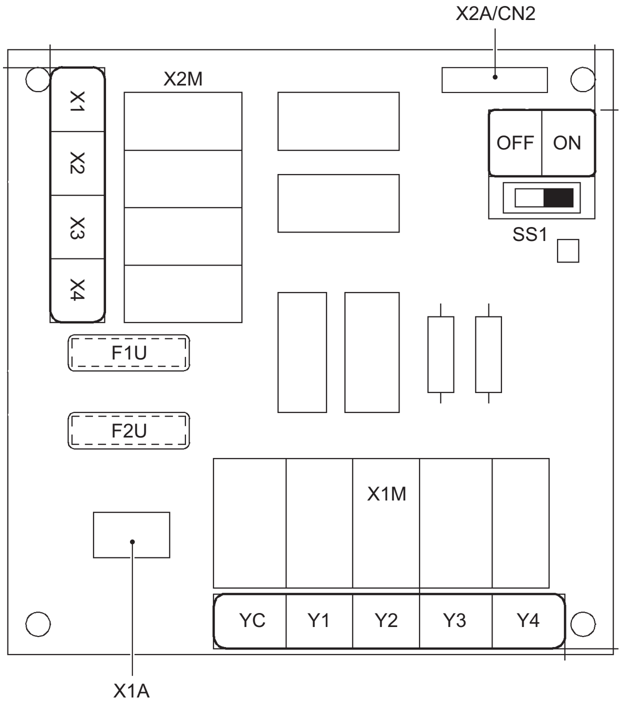
Connector	Color	Connected to - function
L12A	-	Reactor - phase 1
L22A	-	Reactor - phase 2
L32A	-	Reactor - phase 3
U	-	Compressor - phase U
V	-	Compressor - phase V
W	-	Compressor - phase W
X32A	White	HPS
X104A	Ivory	Control PCB X4A
X105A	White	Control PCB X5A
X106A	Red	Fan motor M1F
X107A	Ivory	Fan motor M2F
X108A	White	Control PCB X8A
X109A	Orange	Control PCB X9A
X111A	White	Fin thermistor
X141A	White	-
X142A	White	-
X191A	Blue	Fan reactor
T1	-	Test pin DC+
T2	-	Test pin DC-

2.8 Digital I/O PCB (Option PCB A7P)

Digital I/O PCB (option PCB A7P)



Digital I/O PCB (option PCB A7P)

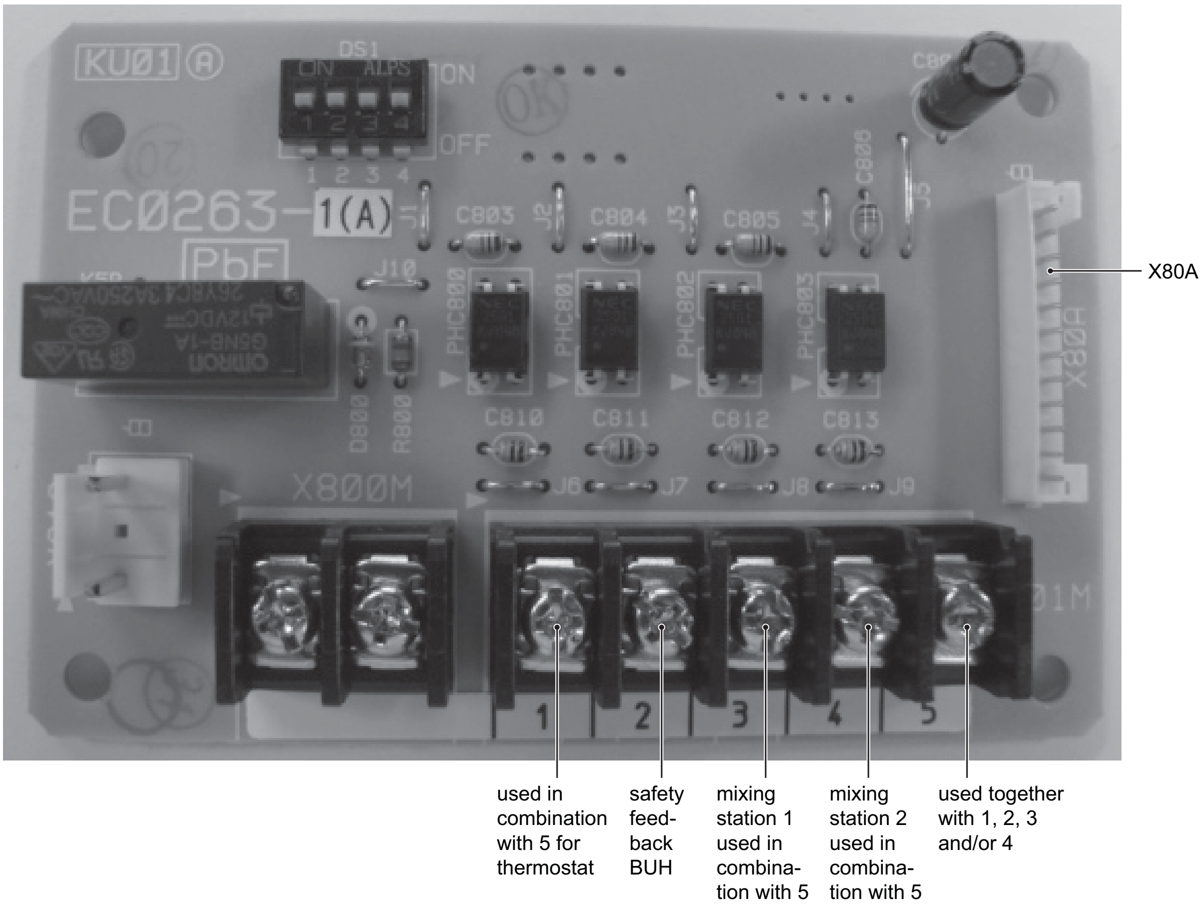


Legend

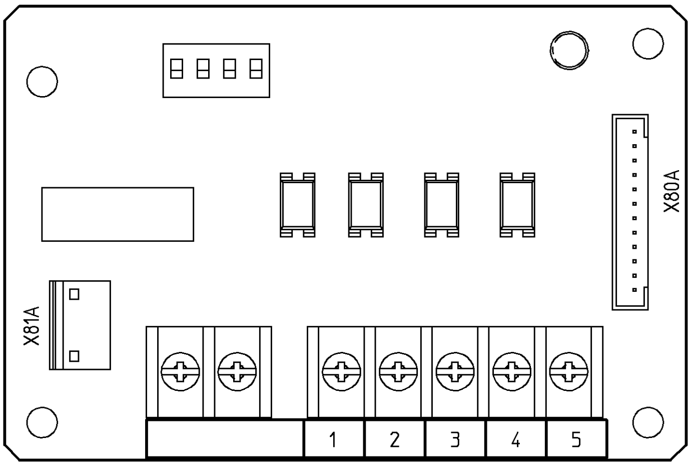
Connector	Color	Connected to - function
X1A	White	X2M [6 - 7]
X2A	White	X33A of main PCB (A1P)
X1	-	Cooling/heating ON/OFF output (optional power supply)
X2	-	
X3	-	Alarm output (optional power supply)
X4	-	
Y1 - YC	-	Domestic hot water mode ON/OFF output
Y3 - YC	-	Solar priority

2.9 Demand PCB (Option PCB A8P)

Demand PCB (option PCB A8P)


X80A
used in combination with 5 for thermostat
safety feed-back BUH
mixing station 1 used in combina-tion with 5
mixing station 2 used in combina-tion with 5
used together with 1, 2, 3 and/or 4

Demand PCB (option PCB A8P)



Legend

Connector	Color	Connected to - function
X80A	White	X85A of main PCB A1P
1 - 5	-	2 core cable for EKRTW on X1M [H - COM] of PCB A10P
1 - 5	-	2 core cable for EKRTR on X1M [H - COM] of PCB A11P + X2M [6 - 7] to X2M [L - N] of A11P + X1M [1 - 3] of A10P to R2T
2 - 5	-	2 core cable for BUH
3 - 5	-	2 core cable for mixing station 1
4 - 5	-	2 core cable for mixing station 2

Part 5 - Function

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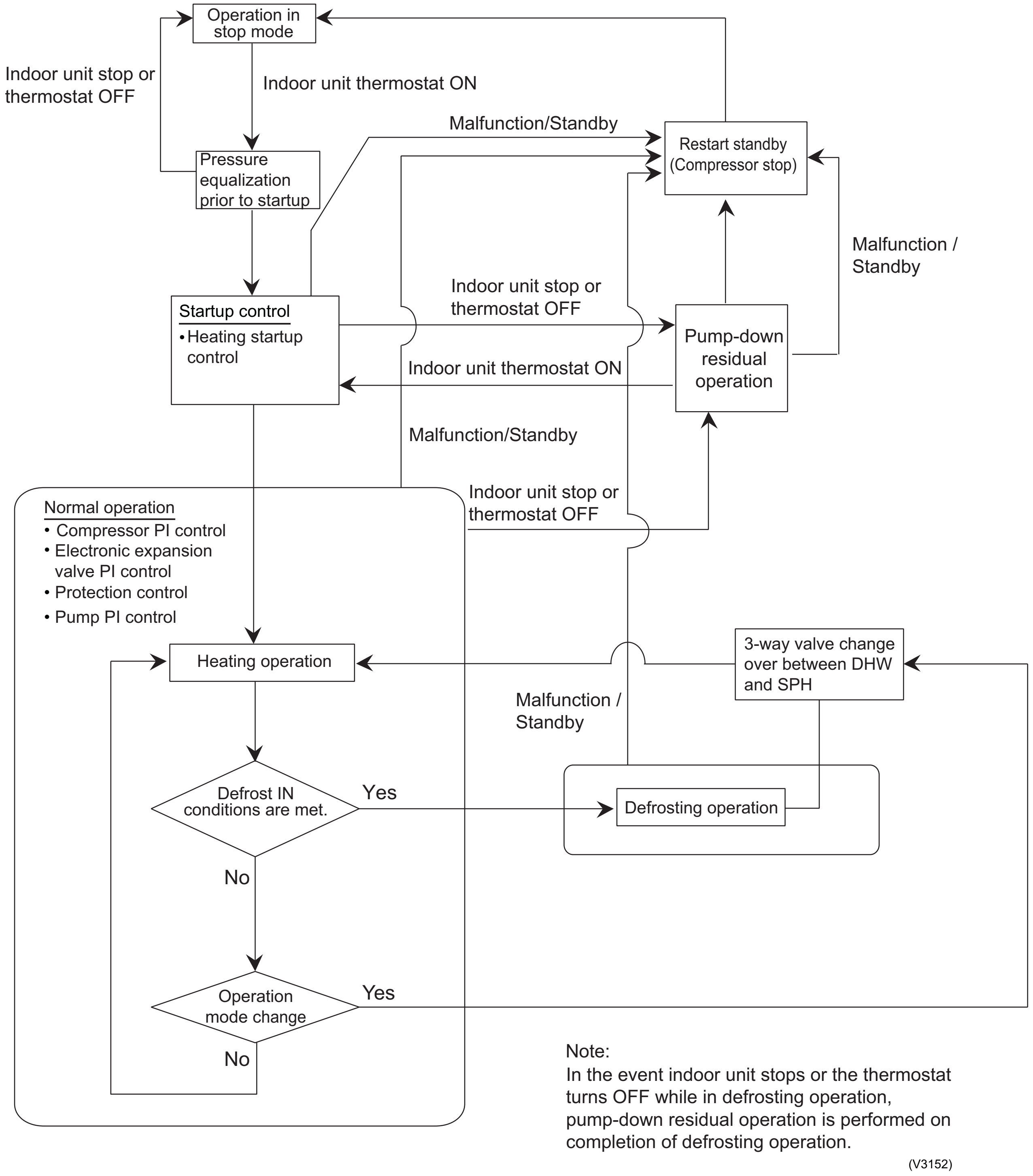
1. Operation Mode


Operation in stop mode
Indoor unit stop or thermostat OFF
Indoor unit thermostat ON
Malfunction/Standby
Restart standby (Compressor stop)
Pressure equalization prior to startup
Malfunction / Standby
Indoor unit stop or thermostat OFF
Startup control
• Heating startup control
Pump-down residual operation
Indoor unit thermostat ON
Malfunction/Standby
Indoor unit stop or thermostat OFF
Normal operation
• Compressor PI control
• Electronic expansion valve PI control
• Protection control
• Pump PI control
Heating operation
3-way valve change over between DHW and SPH
Malfunction / Standby
Defrost IN conditions are met.
Yes
No
Defrosting operation
Operation mode change
Yes
No
(V3152)

Note:
In the event indoor unit stops or the thermostat turns OFF while in defrosting operation, pump-down residual operation is performed on completion of defrosting operation.

2. Basic Control

2.1 Normal Operation

■ **Heating Operation Outdoor Unit**

Actuator	Operation	Remarks
Compressor	Compressor PI control	Used for high pressure protection control, low pressure protection control, discharge pipe temperature protection control, and compressor operating frequency upper limit control with inverter protection control.
Outdoor unit fan	STEP 7 or 8	All steps possible, mainly STEP 7 OR 8
Four way valve	ON	—
Main electronic expansion valve (EV1)	PI control	—
Subcooling electronic expansion valve (EV3)	PI control	—
Hot gas bypass valve (SVP)	OFF	This valve turns on with low pressure protection control.

★Heating operation is not functional at an outdoor air temperature of field setting [9-02]. Default [20°C - 24°C].

■ **Heating Operation Indoor Unit**

Actuator	Operation	Remarks
Compressor	Compressor PI control	Used for high pressure protection control, low pressure protection control, discharge pipe temperature protection control, and compressor operating frequency upper limit control with inverter protection control.
Four way valve (Y1R)	OFF	Only activated during defrost.
Two way valve (K2S) = solenoid valve	CLOSED	Only open during defrost.
Electronic expansion valve (K1E)	PI control	—
Electronic expansion valve (K2E)	PI control	—
DC inverter pump	PI control	—

2.2 Compressor PI Control

Compressor PI Control

Carries out the compressor capacity PI control to maintain Tc at constant during heating operation to ensure stable unit performance.

Outdoor compressor (R-410A)

STn	INV(Fullload)	INV(Unload)
1		36.0Hz
2		39.0Hz
3		43.0Hz
4		47.0Hz
5		52.0Hz
6	52.0Hz	57.0Hz
7	57.0Hz	64.0Hz
8	62.0Hz	71.0Hz
9	68.0Hz	78.0Hz
10	74.0Hz	

STn	INV(Fullload)	INV(Unload)
11	80.0Hz	
12	86.0Hz	
13	92.0Hz	
14	98.0Hz	
15	104.0Hz	
16	110.0Hz	
17	116.0Hz	
18	122.0Hz	
19	128.0Hz	
20	134.0Hz	

STn	INV(Fullload)	INV(Unload)
21	140.0Hz	
22	146.0Hz	
23	152.0Hz	
24	158.0Hz	
25	164.0Hz	
26	170.0Hz	
27	175.0Hz	
28	180.0Hz	
29	185.0Hz	
30	190.0Hz	

∗ Compressors may operate in a pattern other than those listed in above tables subject to the operating conditions.
Selection of full load operation to/from unload operation is made with the unload circuit solenoid valve (Y3S=SVUL). The full load operation is performed with the SVUL set to OFF, while the unload operation is performed with the SVUL set to ON.

Indoor compressor (R-134a)

STEP	INV
1	40.0Hz
2	46.0Hz
3	52.0Hz
4	57.0Hz
5	62.0Hz
6	68.0Hz
7	74.0Hz
8	80.0Hz
9	86.0Hz
10	92.0Hz

STEP	INV
11	98.0Hz
12	104.0Hz
13	110.0Hz
14	116.0Hz
15	122.0Hz
16	128.0Hz
17	134.0Hz
18	138.0Hz
19	144.0Hz
20	152.0Hz

STEP	INV
21	158.0Hz
22	164.0Hz
23	170.0Hz
24	174.0Hz
25	182.0Hz
26	188.0Hz
27	194.0Hz
28	200.0Hz
29	206.0Hz
30	210.0Hz

11kW -> max. 21 steps
14kW -> max. 26 steps
16kW -> max. 30 steps

2.3 Electronic Expansion Valve PI Control R-410A circuit

Main Electronic Expansion Valve EV1 Control - Outdoor Unit

Carries out the electronic expansion valve (Y1E) PI control to maintain the evaporator outlet superheated degree (SH) at constant during heating operation to make maximum use of the outdoor unit heat exchanger (evaporator).

SH = Ts1 - Te

SH : Evaporator outlet superheated degree (°C)

Ts1 : Suction pipe temperature detected by thermistor R3T (°C)

Te : Low pressure equivalent saturation temperature (°C)

The optimum initial value of the evaporator outlet superheated degree is 3°C, but varies depending on the discharge pipe superheated degree of inverter compressor.

Subcooling Electronic Expansion Valve EV3 Control - Outdoor Unit

Makes PI control of the electronic expansion valve (Y3E) to keep the superheated degree (SH) of the outlet gas pipe on the evaporator side for the full use of the subcooling heat exchanger.

SH = Tsh - Te

SH : Outlet superheated degree of evaporator (°C)

Tsh : Suction pipe temperature detected with the thermistor R4T (°C)

Te : Low pressure equivalent saturation temperature (°C)

Electronic Expansion Valve K1E Control - Indoor Unit

Carries out the electronic expansion valve (K1E) PI control to maintain the condensor outlet subcooled degree (SC) at constant during heating operation to make maximum use of the indoor unit heat exchanger (condensor).

SC = Tc - R3T

2.4 Electronic Expansion Valve PI Control R-134a circuit

Electronic Expansion Valve K2E Control - Indoor Unit

Carries out the electronic expansion valve (K1E) PI control to maintain the condensor outlet subcooled degree (SC) at constant during heating operation to make maximum use of the indoor unit heat exchanger (condensor).

SC = Tc - R7T

3. Special Control

3.1 Startup Control

This control is used to equalize the pressure in the front and back of the compressor prior to the startup of the compressor, thus reducing startup loads. Furthermore, the inverter is turned ON to charge the capacitor.
In addition, to avoid stresses to the compressor after the startup, the following control is made and the position of the four way valve is also determined. To position the four way valve, the master and slave units simultaneously start up.

3.1.1 Startup Control in Heating Operation

Outdoor

Thermostat ON

	Pressure equalization control prior to startup	Startup control	
		STEP1	STEP2
Compressor	0 Hz	57 Hz Unload	57 Hz Unload +2 steps/20 sec. (until Pc - Pe>0.39MPa is achieved)
Outdoor unit fan	From starting ~ 1 min. : STEP 7 1 ~ 3 min. : STEP 3 3 ~ 5 min. : OFF	STEP8	STEP8
Four way valve	Holds	ON	ON
Main electronic expansion valve (EV1)	0 pls	0 pls	0 pls
Subcooling electronic expansion valve (EV3)	0 pls	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	OFF	OFF
Ending conditions	OR • Pc - Pe<0.3MPa • A lapse of 1 to 5 min.	A lapse of 10 sec.	OR • A lapse of 130 sec. • Pc>2.70MPa • Pc - Pe>0.39MPa

Indoor

	STEP1	STEP2
Indoor compressor	First 10 minutes -> maximum 128 Hz*	To maximum frequency
4-way valve	OFF	OFF
Pump	HOT START OR • High pressure side > 14 bar • Maximum 5 minutes	Gradual to PI control

* Always after POWER ON/OFF, compressor frequency is limited. This is not the case after thermo ON/OFF/ON.

Remark: A thermostat ON demand will activate the outdoor fan, followed by the outdoor compressor and finally indoor compressor.

3.2 Defrosting Operation

The defrost operation is performed to solve frost on the outdoor unit heat exchanger when heating mode is active to recover the heating capacity.

[Conditions to start]

The defrost operation is started referring following conditions.

- Outdoor heat exchanger heat transfer co-efficient
- Temperature of heat-exchange (Tb) < T_{def}*
- Timer (25 min. the minimum)
  In addition, outdoor heat-exchanger co-efficient is derived from Tc, Te, and the compressor load.

*T_{def} can vary but is at least -10°C

[Fan defrosting]

- When compressor stops, 80 sec. at low RPM
- At start up compressor, 30 sec. at 950 RPM (step 9)
- Then goes back to normal RPM

3.3 Pump-down Residual Operation

When activating compressor, if the liquid refrigerant remains in the heat-exchanger, the liquid enters into the compressor and dilutes oil therein resulting in decrease of lubricity.

Therefore, the pump-down residual operation is performed to collect the refrigerant in the heat-exchanger when the compressor is down.

3.3.1 Pump-down Residual Operation in Heating Operation [R-410A]

Actuator	Pump-down residual operation
Compressor	124 Hz Full load
Outdoor unit fan	STEP7
Four way valve	ON
Main electronic expansion valve (EV1)	0 pls
Subcooling electronic expansion valve (EV3)	0 pls
Hot gas bypass valve (SVP)	OFF
Ending conditions	4 sec.

3.4 Stopping Operation

Operation of the actuator when the system is down, is cleared up.

3.4.1 When System is in Stop Mode

OUTDOOR

Actuator	Operation
Compressor	OFF
Outdoor unit fan	OFF
Four way valve	Keep former condition.
Main electronic expansion valve (EV1)	0 pls
Subcooling electronic expansion valve (EV3)	0 pls
Hot gas bypass valve (SVP)	OFF
Ending conditions	Request for space heating OR hot water production

INDOOR

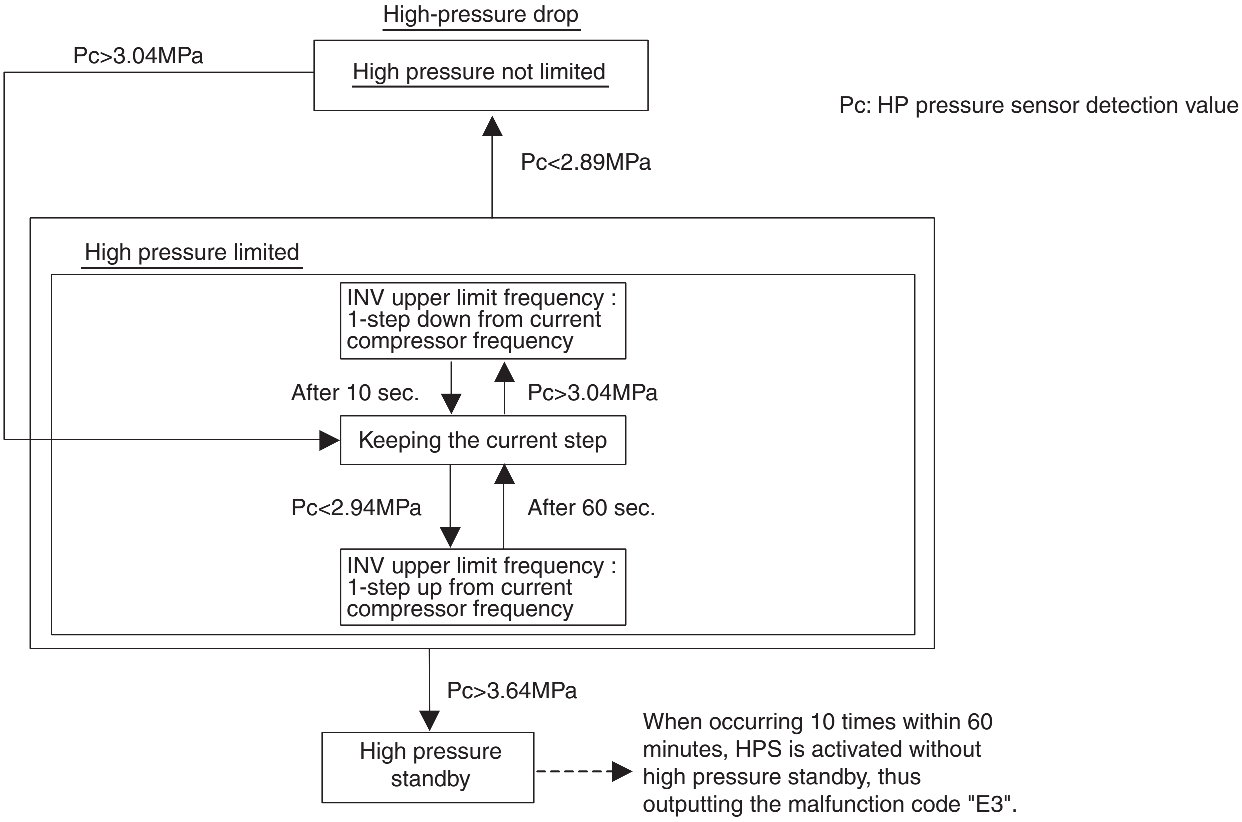
Actuator	Operation
Compressor	OFF
4-way valve	Keep former condition.
Pump	OFF
Electronic expansion valve K1E - R-410A	0 pls
Electronic expansion valve K2E - R-134a	0 pls
Ending conditions	Request for space heating OR hot water production

4. Protection Control

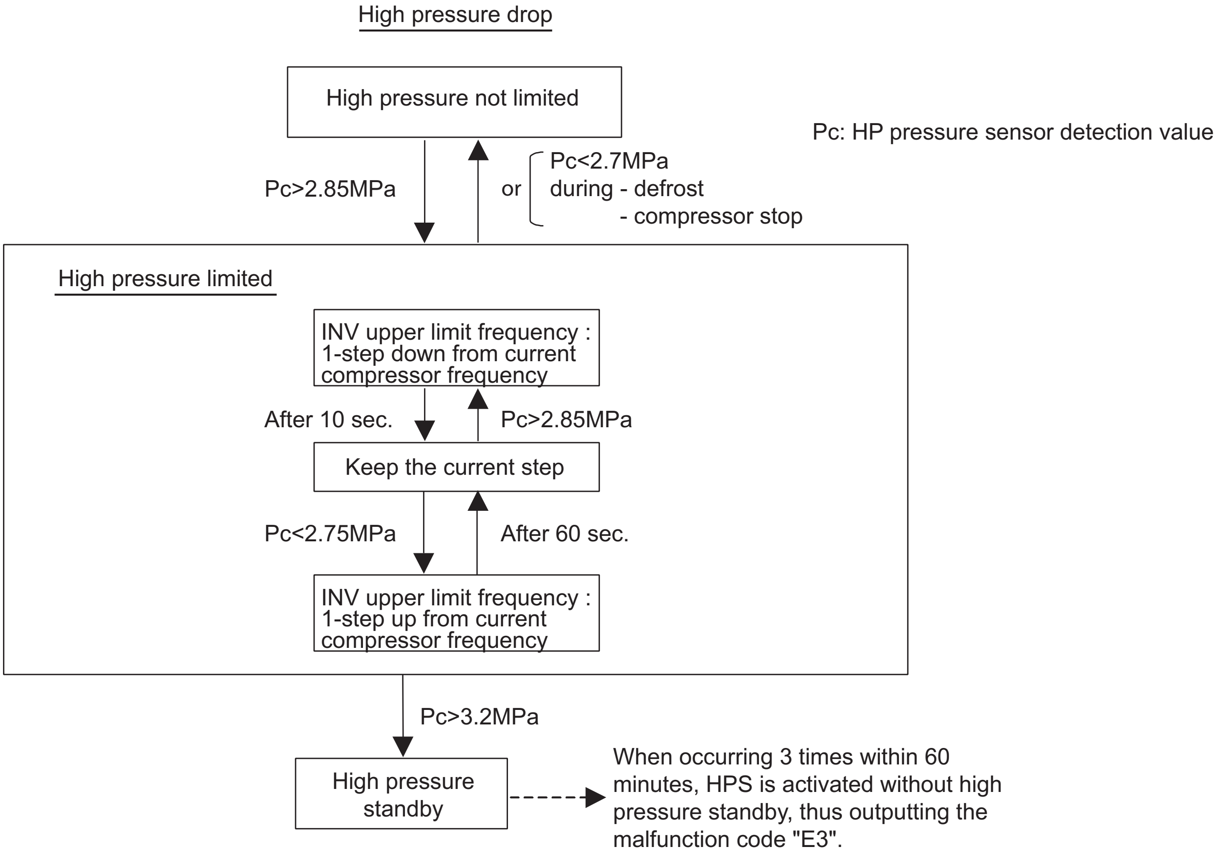
4.1 High Pressure Protection Control

This high pressure protection control is used to prevent the activation of protection devices due to abnormal increase of high pressure and to protect compressors against the transient increase of high pressure.

In heating operation [R-410A]


High-pressure drop
High pressure not limited
Pc>3.04MPa
Pc: HP pressure sensor detection value
Pc<2.89MPa
High pressure limited
INV upper limit frequency : 1-step down from current compressor frequency
After 10 sec.
Pc>3.04MPa
Keeping the current step
Pc<2.94MPa
After 60 sec.
INV upper limit frequency : 1-step up from current compressor frequency
Pc>3.64MPa
High pressure standby
When occurring 10 times within 60 minutes, HPS is activated without high pressure standby, thus outputting the malfunction code "E3".

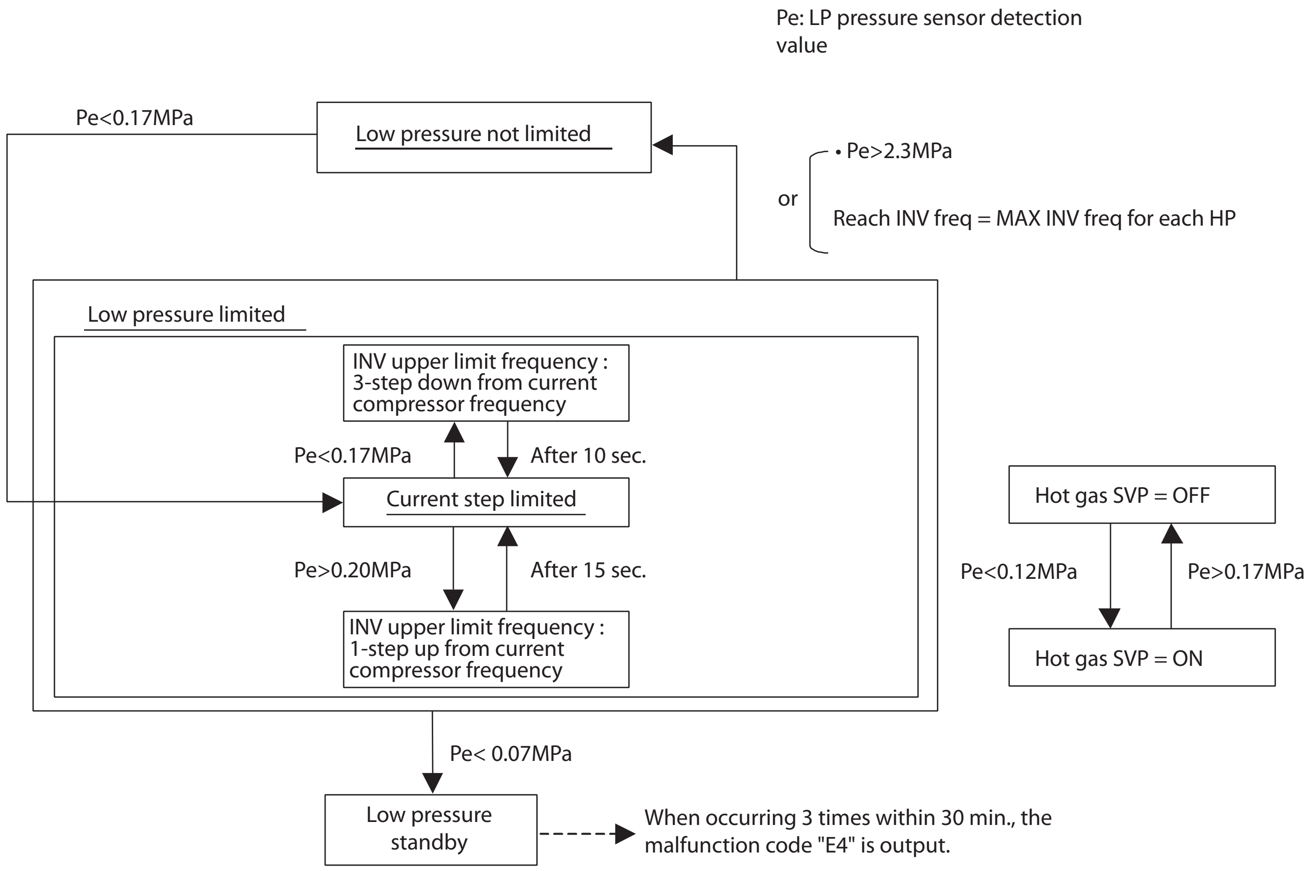
In heating operation [R-134a]


High pressure drop
High pressure not limited
Pc: HP pressure sensor detection value
Pc>2.85MPa
or
Pc<2.7MPa
during - defrost
- compressor stop
High pressure limited
INV upper limit frequency : 1-step down from current compressor frequency
After 10 sec.
Pc>2.85MPa
Keep the current step
Pc<2.75MPa
After 60 sec.
INV upper limit frequency : 1-step up from current compressor frequency
Pc>3.2MPa
High pressure standby
When occurring 3 times within 60 minutes, HPS is activated without high pressure standby, thus outputting the malfunction code "E3".

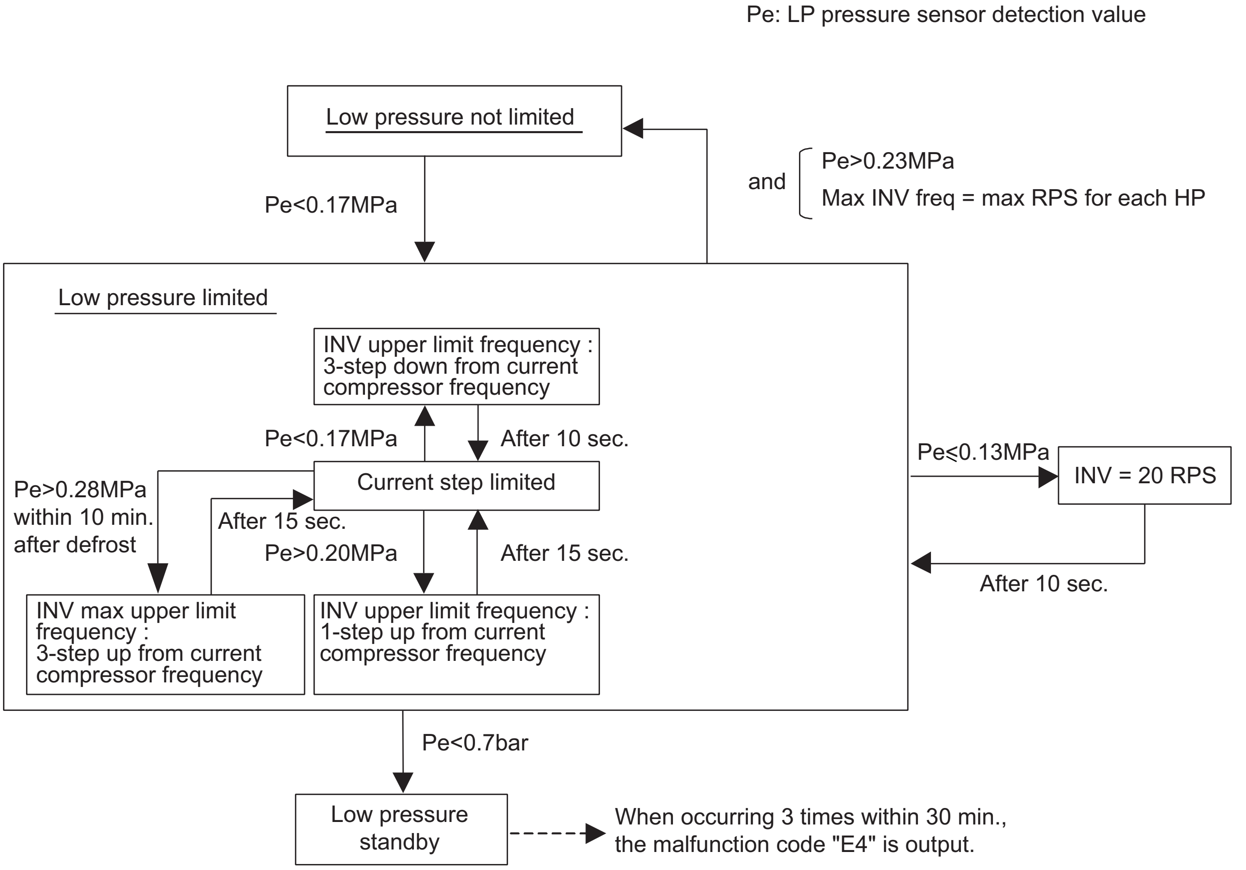
4.2 Low Pressure Protection Control

This low pressure protection control is used to protect compressors against the transient decrease of low pressure.

In heating operation [R-410A]


Pe: LP pressure sensor detection value
Pe<0.17MPa
Low pressure not limited
• Pe>2.3MPa
or
Reach INV freq = MAX INV freq for each HP
Low pressure limited
INV upper limit frequency : 3-step down from current compressor frequency
Pe<0.17MPa
After 10 sec.
Current step limited
Pe>0.20MPa
After 15 sec.
INV upper limit frequency : 1-step up from current compressor frequency
Hot gas SVP = OFF
Pe<0.12MPa
Pe>0.17MPa
Hot gas SVP = ON
Pe< 0.07MPa
Low pressure standby
When occurring 3 times within 30 min., the malfunction code "E4" is output.

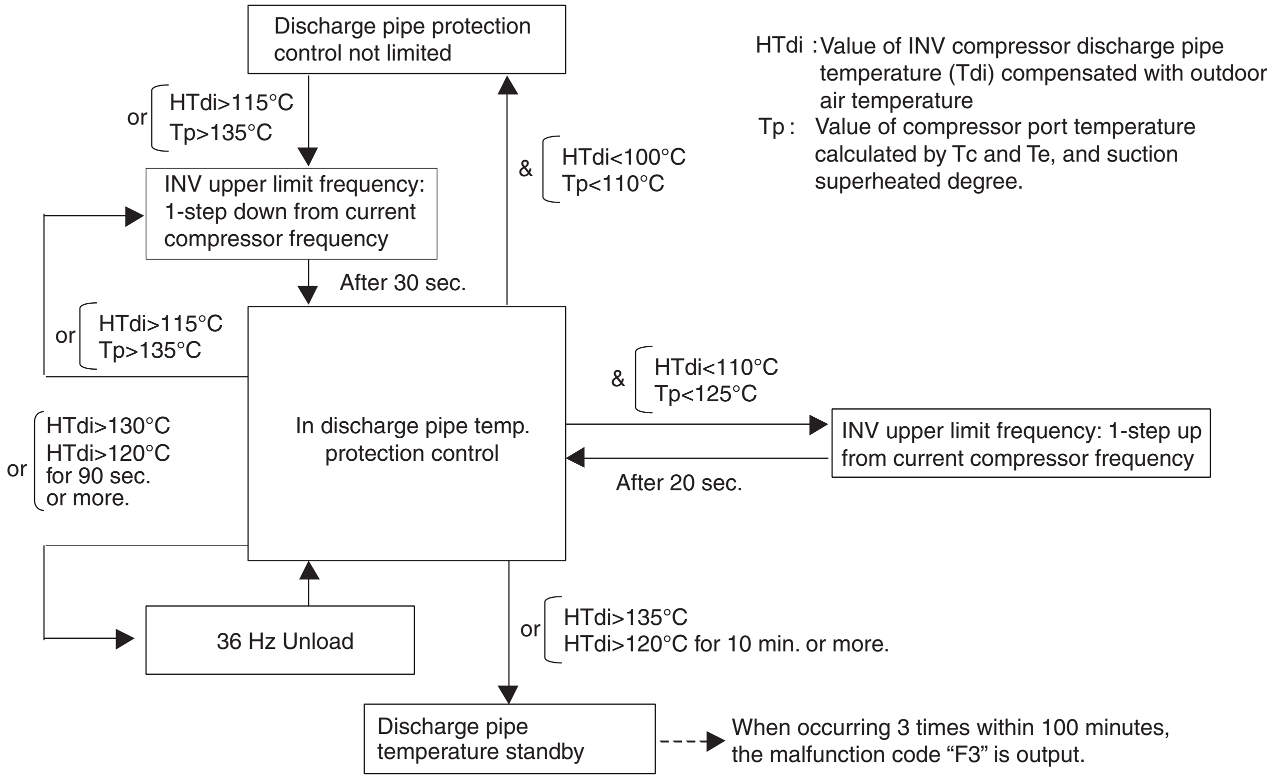
In heating operation [R-134a]


Pe: LP pressure sensor detection value
Low pressure not limited
Pe<0.17MPa
and
Pe>0.23MPa
Max INV freq = max RPS for each HP
Low pressure limited
INV upper limit frequency : 3-step down from current compressor frequency
Pe<0.17MPa
After 10 sec.
Current step limited
Pe>0.28MPa within 10 min. after defrost
After 15 sec.
Pe>0.20MPa
After 15 sec.
INV max upper limit frequency : 3-step up from current compressor frequency
INV upper limit frequency : 1-step up from current compressor frequency
Pe≤0.13MPa
INV = 20 RPS
After 10 sec.
Pe<0.7bar
Low pressure standby
When occurring 3 times within 30 min., the malfunction code "E4" is output.

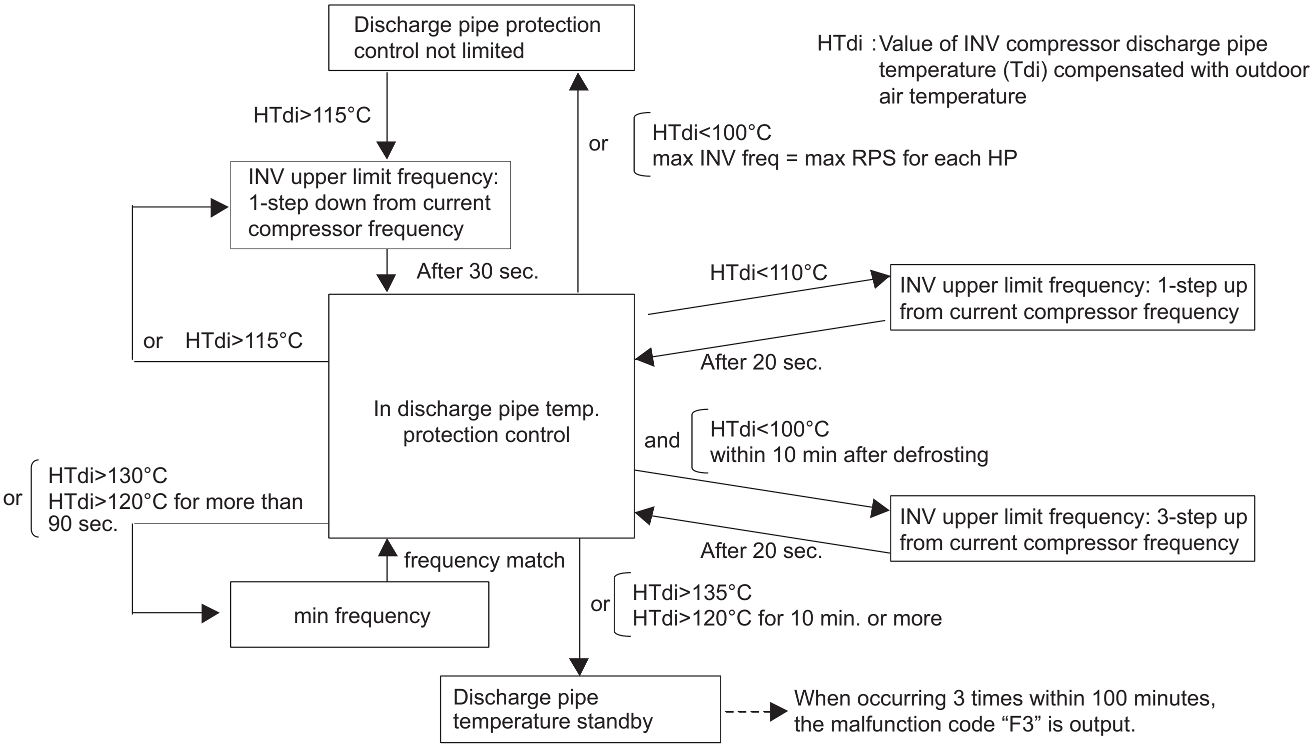
4.3 Discharge Pipe Protection Control

This discharge pipe protection control is used to protect the compressor internal temperature against a malfunction or transient increase of discharge pipe temperature.

INV compressor [R-410A]


Discharge pipe protection control not limited
HTdi : Value of INV compressor discharge pipe temperature (Tdi) compensated with outdoor air temperature
Tp : Value of compressor port temperature calculated by Tc and Te, and suction superheated degree.
or HTdi>115°C Tp>135°C
& HTdi<100°C Tp<110°C
INV upper limit frequency: 1-step down from current compressor frequency
After 30 sec.
or HTdi>115°C Tp>135°C
In discharge pipe temp. protection control
& HTdi<110°C Tp<125°C
INV upper limit frequency: 1-step up from current compressor frequency
After 20 sec.
or HTdi>130°C HTdi>120°C for 90 sec. or more.
36 Hz Unload
or HTdi>135°C HTdi>120°C for 10 min. or more.
Discharge pipe temperature standby
When occurring 3 times within 100 minutes, the malfunction code “F3” is output.

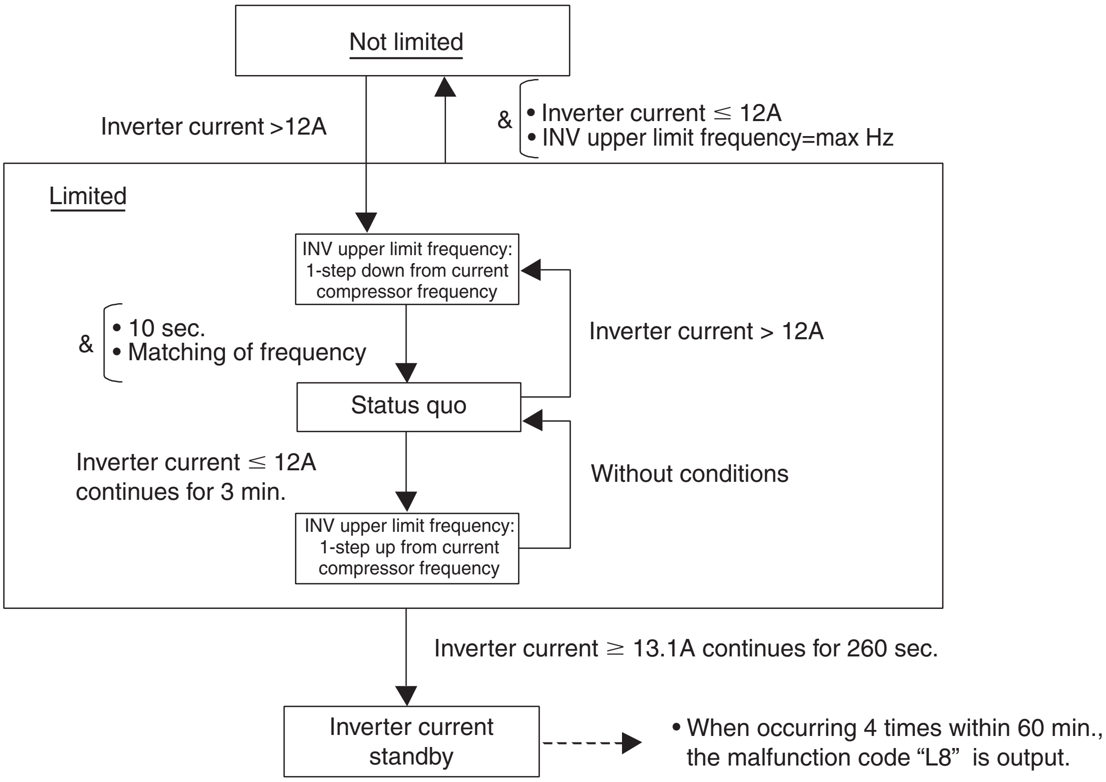
INV compressor [R-134a]


Discharge pipe protection control not limited
HTdi : Value of INV compressor discharge pipe temperature (Tdi) compensated with outdoor air temperature
HTdi>115°C
or HTdi<100°C max INV freq = max RPS for each HP
INV upper limit frequency: 1-step down from current compressor frequency
After 30 sec.
HTdi<110°C
INV upper limit frequency: 1-step up from current compressor frequency
or HTdi>115°C
After 20 sec.
In discharge pipe temp. protection control
and HTdi<100°C within 10 min after defrosting
or HTdi>130°C HTdi>120°C for more than 90 sec.
INV upper limit frequency: 3-step up from current compressor frequency
After 20 sec.
frequency match
min frequency
or HTdi>135°C HTdi>120°C for 10 min. or more
Discharge pipe temperature standby
When occurring 3 times within 100 minutes, the malfunction code “F3” is output.

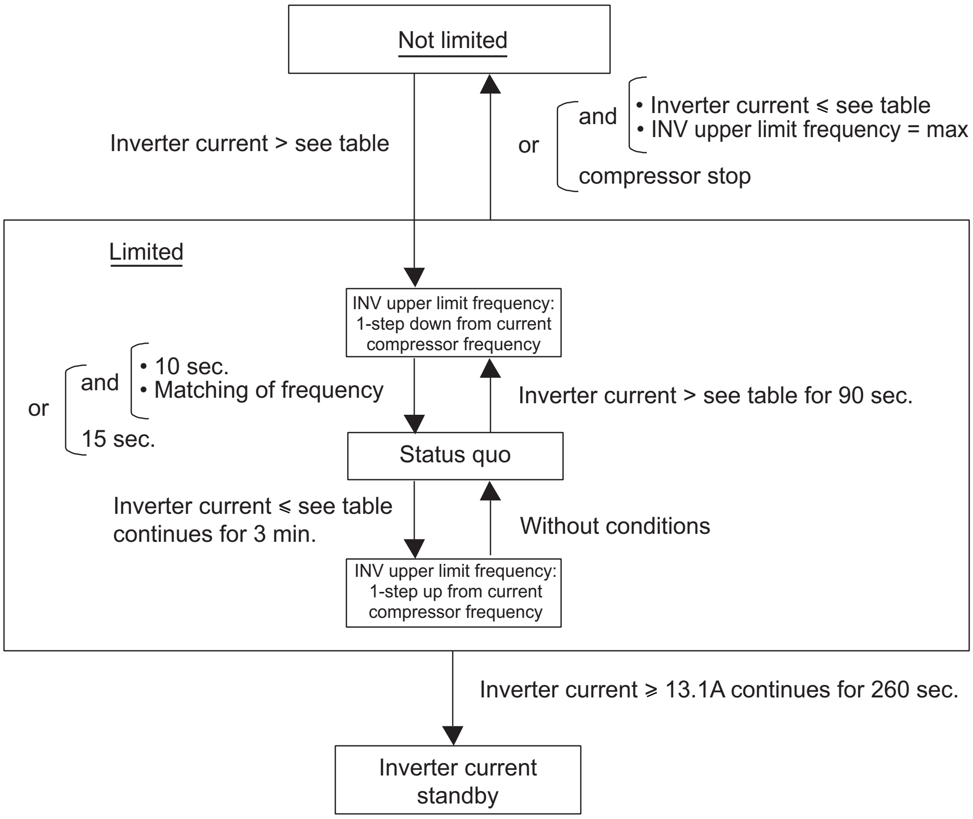
4.4 Inverter Protection Control

Inverter current protection control and inverter fin temperature control are performed to prevent tripping due to a malfunction, or transient inverter overcurrent, and fin temperature increase.

Inverter overcurrent protection control [R-410A]


Not limited
Inverter current >12A
&
• Inverter current ≤ 12A
• INV upper limit frequency=max Hz
Limited
INV upper limit frequency: 1-step down from current compressor frequency
&
• 10 sec.
• Matching of frequency
Inverter current > 12A
Status quo
Inverter current ≤ 12A continues for 3 min.
Without conditions
INV upper limit frequency: 1-step up from current compressor frequency
Inverter current ≥ 13.1A continues for 260 sec.
Inverter current standby
• When occurring 4 times within 60 min., the malfunction code "L8" is output.

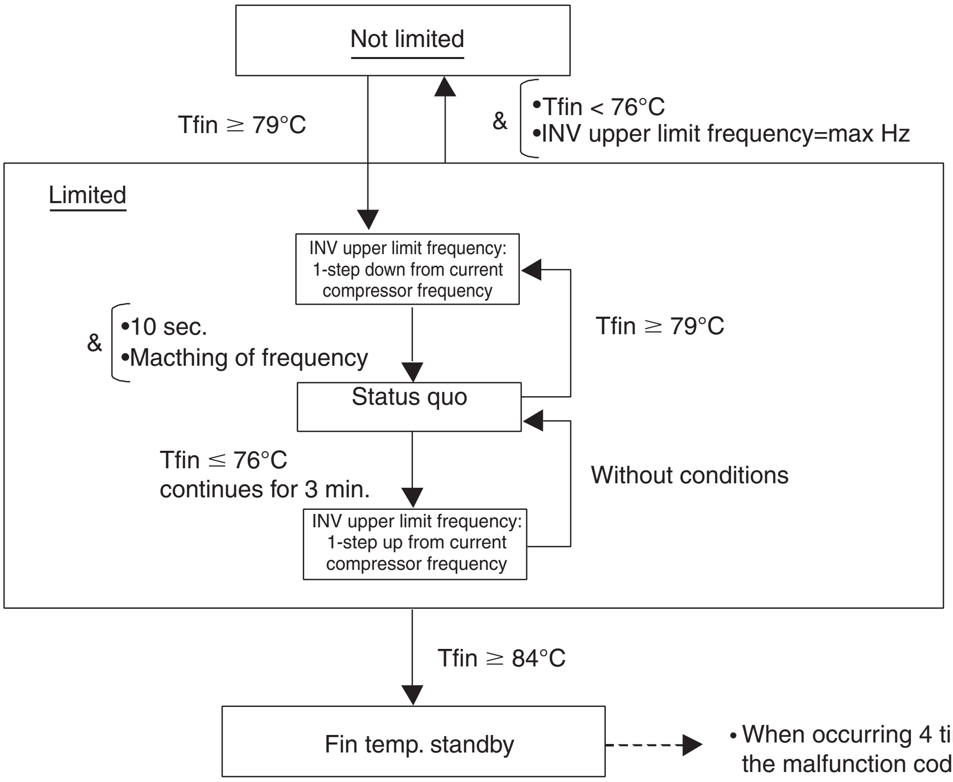
Inverter overcurrent protection control [R-134a]


Not limited
Inverter current > see table
or
and
• Inverter current ⩽ see table
• INV upper limit frequency = max Hz
compressor stop
Limited
INV upper limit frequency: 1-step down from current compressor frequency
or
and
• 10 sec.
• Matching of frequency
15 sec.
Inverter current > see table for 90 sec.
Status quo
Inverter current ⩽ see table continues for 3 min.
Without conditions
INV upper limit frequency: 1-step up from current compressor frequency
Inverter current ⩾ 13.1A continues for 260 sec.
Inverter current standby

Table

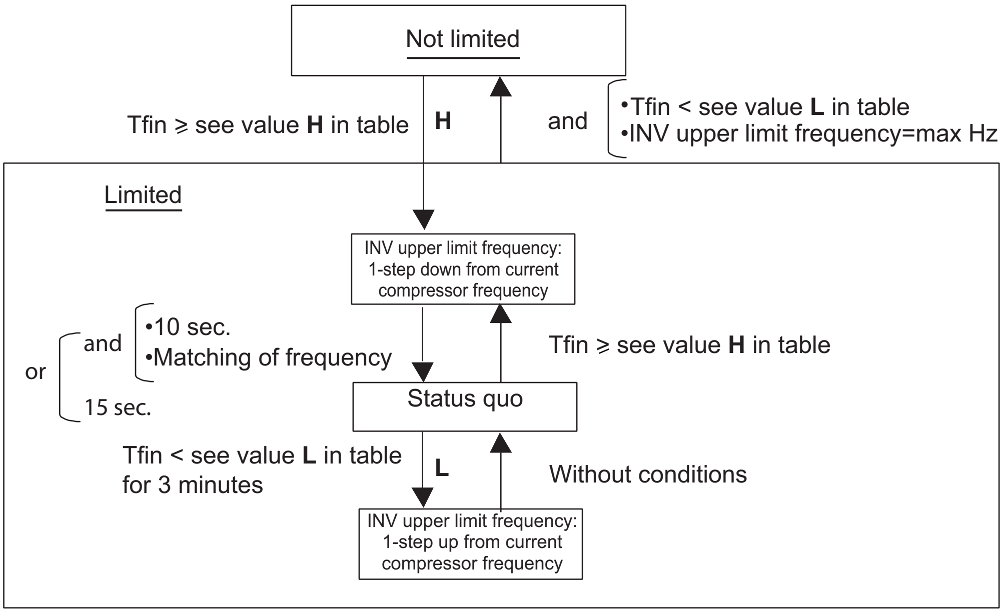
	230V	400V
current value	23,8A	9,5A

Inverter fin temperature control [R-410A]


Not limited
Tfin ≥ 79°C
&
•Tfin < 76°C
•INV upper limit frequency=max Hz
Limited
INV upper limit frequency: 1-step down from current compressor frequency
&
•10 sec.
•Macthing of frequency
Tfin ≥ 79°C
Status quo
Tfin ≤ 76°C continues for 3 min.
Without conditions
INV upper limit frequency: 1-step up from current compressor frequency
Tfin ≥ 84°C
Fin temp. standby

- When occurring 4 times within 60 min., the malfunction code "L4" is output.

Inverter fin temperature control [R-134a]


Not limited
Tfin ⩾ see value **H** in table
H
and
•Tfin < see value **L** in table
•INV upper limit frequency=max Hz
Limited
INV upper limit frequency: 1-step down from current compressor frequency
or
and
•10 sec.
•Matching of frequency
15 sec.
Tfin ⩾ see value **H** in table
Status quo
Tfin < see value **L** in table for 3 minutes
L
Without conditions
INV upper limit frequency: 1-step up from current compressor frequency

Table

	230V	400V
H	78°	79°
L	75°	76°

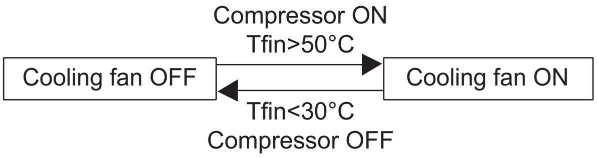
5. Other Control

5.1 Heating Operation Prohibition

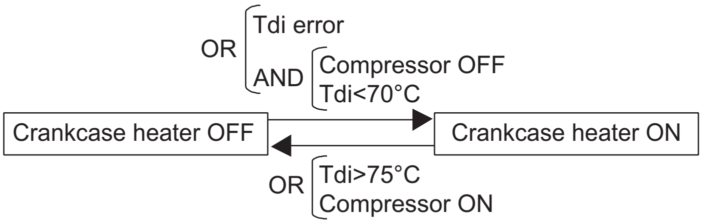
- If the ambient temperature becomes higher than (24°C + value of setting [9-02]) no space heating is possible
- Heating for domestic hot water is possible till 35°C ambient temperature.

For more details see chapter of settings.

5.2 Inverter Fan Control (Switch Box Fan)



5.3 Crankcase Heater



6. Outline of Control (Indoor Unit)

6.1 Freeze Prevention

Freeze-up Prevention by Thermo Off Condition

The freeze-up prevention is only active when the unit is in thermo OFF condition.

[Start condition]

AND/OR*:
- Outdoor ambient temperature < 4°C
- Leaving or return water temperature < 7°C

* AND/OR depending of setting [8 - 04] for further details see chapter of setting.

[Operation]

Pump will operate and if leaving OR return water < 5°C for 5 minutes, the unit will start up the freeze-up prevention function to prevent too low temperatures.

6.2 Simultaneous demand of space heating and domestic water heating

Space heating operation can be executed in 3 different ways:

- Remote controller leaving water temperature control
- External room thermostat
- Remote controller room temperature control

The domestic water heating operation can be controlled in 2 different ways:

- Reheat operation:
  The reheat mode will prevent the domestic hot water from cooling down lower than a certain temperature. When enabled the indoor unit will deliver hot water to the domestic hot water tank if the minimum value is reached and this according below described settings. ***1**
- Storage operation:
  In this mode, the indoor unit will deliver hot water to the domestic hot water tank based on a daily pattern (day and/or night). The heated water is stored at a higher temperature so it can fulfill the domestic hot water requirements throughout the day. ***2**

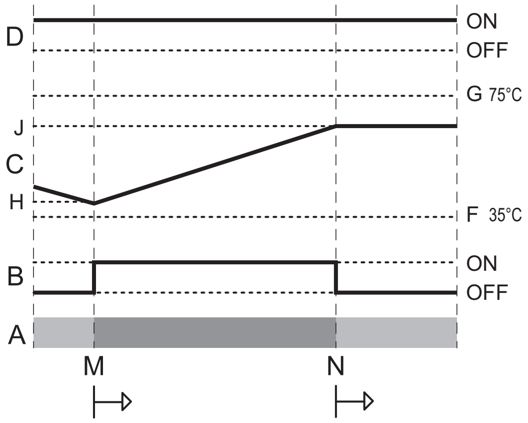
***1 Remark:** This function can only be activated by the shower button. Shower icon should be led.

***2 Remark:** This function can only be set by field settings. This function can only be activated by the schedule timer button and this icon should be led.

Remote controller leaving water temperature control

When the reheat temperature is reached, the further heat up till storage temperature of the domestic hot water tank will be decided by the running timers which are programmed by the installer.

1. Reheat operation
   When requesting space heating and domestic water heating (reheat) at the same time, this involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side. Now, the domestic water will be heated till maximum reheat temperature (setting [b-01]). The 3-way valve will switch back to original position, then space heating will start again. When a domestic hot water tank is installed, the reheat function is always available. The minimum domestic hot water reheat temperature is 35°C and the maximum value is 75°C.

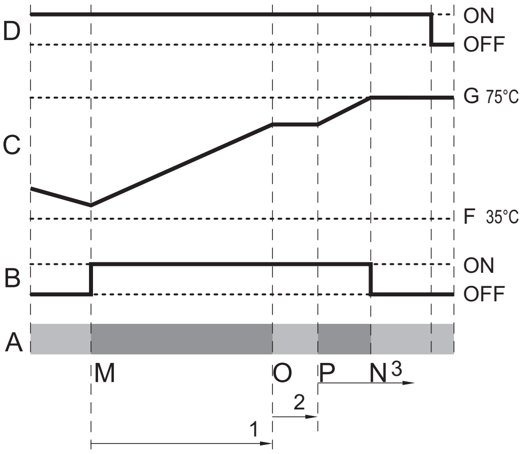


A	Operation
▒	Space heating
▓	Domestic water heating
B	Domestic hot water reheat thermo-on request
C	Domestic hot water tank temperature
D	Leaving water thermo-on request
F	Domestic hot water lower limit temperature
G	Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]

H	Domestic hot water reheat minimum temperature [b-00]
J	Domestic hot water reheat maximum temperature [b-01]
M	Simultaneous demand
N	ONLY space heating request
ON	ON
OFF	OFF

2. Storage operation

   When requesting space heating and domestic water heating (storage) at the same time, this involves that the storage function is active and the start timer is reached (setting 1) during space heating operation. The 3-way valve will switch over to domestic water heating operation. Now domestic water will be produced till set point is reached or according to the running timer (setting [d-01]). The 3-way valve will switch back to space heating mode for the interval period (setting [d-02]). After this interval the 3-way valve will go back to domestic water mode. This will continue till set point is reached. At that moment, simultaneous request is finished and the system goes back to space heating mode.

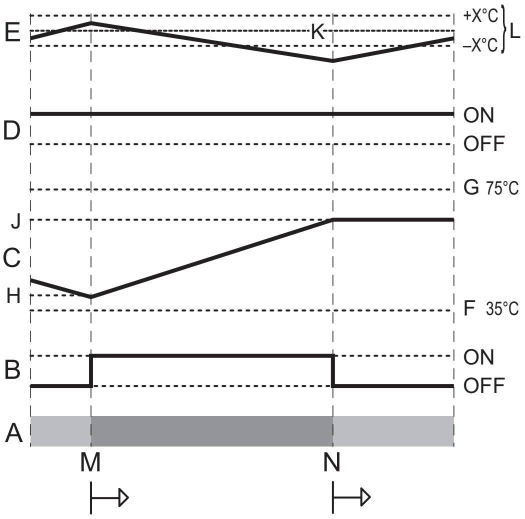


A	Operation
▨	Space heating
■	Domestic water heating
B	Domestic hot water storage thermo-on request
C	Domestic hot water tank temperature
D	Leaving water thermo-on request
F	Domestic hot water lower limit temperature
G	Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
M	Simultaneous demand
N	ONLY space heating request
O	Start of interval period
P	Stop of interval period
ON	ON
OFF	OFF
1	Maximum operation time for 1 cycle of domestic water heating (initial 30 minutes [d-01])
2	Interval minimum stop time for domestic water heating (initial 15 minutes [d-02])
3	Maximum operation time for domestic water heating (initial 30 minutes [d-01])

External room thermostat

When the reheat temperature is reached, the further heat up of the domestic hot water tank will be decided by the external room thermostat thermo conditions and running timers which are programmed by the installer.

1. Reheat operation
   When requesting space heating and domestic water heating (reheat) at the same time. This involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side. The domestic water will be heated till maximum reheat temperature (setting [b-01]). The 3-way valve will switch back to original position, then space heating will start again.
   During the reheat operation, the system does not take care about the room temperature. This means that during simultaneous demand, the reheat operation has priority over the room temperature.

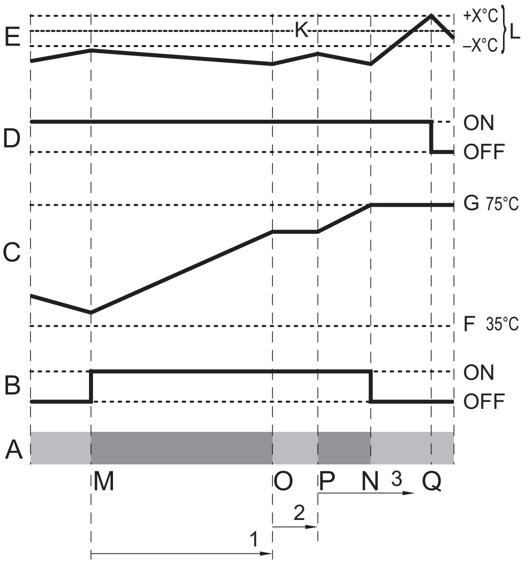


A	Operation
░	Space heating
▓	Domestic water heating
B	Domestic hot water reheat thermo-on request
C	Domestic hot water tank temperature
D	Room temperature thermo-on request
E	Remote controller room temperature
F	Domestic hot water lower limit temperature
G	Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
H	Domestic hot water reheat minimum temperature [b-00]
J	Domestic hot water reheat maximum temperature [b-01]
K	External room thermostat set point
L	External room thermostat ON/OFF hysteresis
M	Simultaneous demand
N	ONLY space heating request
ON	ON
OFF	OFF

2. Storage operation

   When requesting space heating and domestic water heating (storage) at the same time, this involves that the storage function is active and the start timer is reached (setting 1) during space heating operation. The 3-way valve will switch over to domestic water heating operation. Now domestic water will be produced till set point is reached or according to the running timer (setting [d-01]). The 3-way valve will switch back to space heating mode for the interval period (setting [d-02]). After this interval the 3-way valve will go back to domestic water mode. This will continue till set point is reached. At that moment, simultaneous request is finished and the system goes back to space heating mode.

   During the storage operation, the system does not take care off the room temperature. This means that during simultaneous demand, the space only will be heated during the intervals of domestic water production.

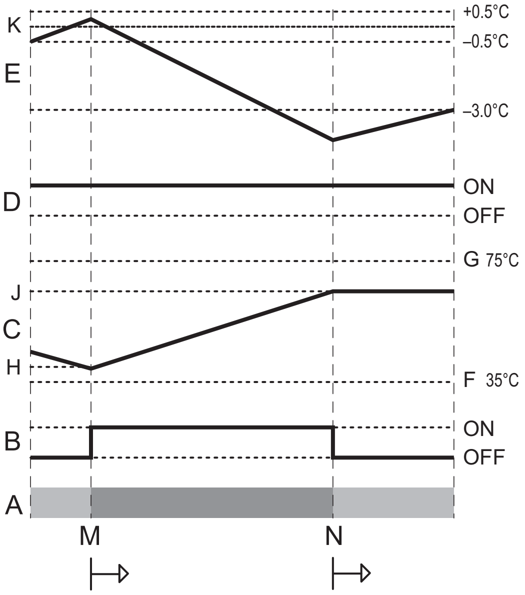


A	Operation
░	Space heating
▓	Domestic water heating
B	Domestic hot water storage thermo-on request
C	Domestic hot water tank temperature
D	Room temperature thermo-on request
E	Remote controller room temperature
F	Domestic hot water lower limit temperature
G	Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
K	External room thermostat set point
L	External room thermostat ON/OFF hysteresis
M	Simultaneous demand
N	ONLY space heating request
O	Start off interval period
P	Stop off interval period
Q	Space heating OFF
ON	ON
OFF	OFF
1	Maximum operation time for 1 cycle of domestic water heating (initial 30 minutes [d-01])
2	Interval minimum stop time for domestic water heating (initial 15 minutes [d-02])
3	Maximum operation time for domestic water heating (initial 30 minutes [d-01])

Remote controller room temperature control

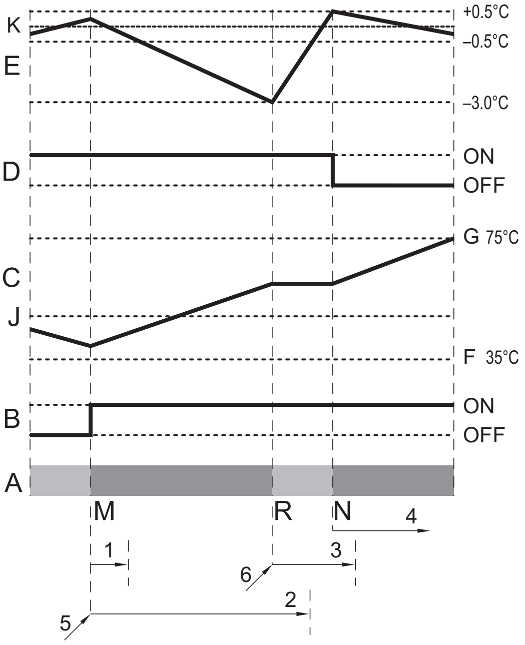
When the reheat temperature is reached, the further heat up till storage temperature of the domestic hot water tank will be decided by the remote controller room thermostat in order to prevent that the room temperature drops too much.

1. Reheat operation
   When requesting space heating and domestic water heating (reheat) at the same time. This involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side. The domestic water will be heated till maximum reheat temperature (setting [b-01]). The 3-way valve will switch back to original position, then space heating will start again.
   During the reheat operation, the system does not take care about the room temperature. This means that during simultaneous demand, the reheat operation has priority over the room temperature.



A	Operation
░	Space heating
▓	Domestic water heating
B	Domestic hot water reheat thermo-on request
C	Domestic hot water tank temperature
D	Room temperature thermo-on request
E	Remote controller room temperature
F	Domestic hot water lower limit temperature
G	Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
H	Domestic hot water reheat minimum temperature [b-00]
J	Domestic hot water reheat maximum temperature [b-01]
K	Remote controller thermostat set point
M	Simultaneous demand
N	ONLY space heating request
ON	ON
OFF	OFF

2. Storage operation
   When requesting space heating and domestic water heating (storage) at the same time, this involves that the minimum reheat temperature is reached (setting [b-00]) during space heating operation. The 3-way valve will switch over to the domestic hot water side, then the domestic water will be heated, but as soon as the room temperature drops 3°C from set point (smart logic), the 3-way valve will go to original position and start space heating till 0.5°C above set point, then the 3-way valve will switch over to the domestic hot water side and then the domestic water will be heated again till storage set point.



A	Operation
░	Space heating
▓	Domestic water heating
B	Domestic hot water storage thermo-on request
C	Domestic hot water tank temperature
D	Room temperature thermo-on request
E	Remote controller room temperature
F	Domestic hot water lower limit temperature
G	Domestic hot water upper limit temperature (maximum possible storage temperature) [b-03]
J	Domestic hot water reheat maximum temperature [b-01]
K	Remote controller thermostat set point
M	Simultaneous demand
N	ONLY domestic hot water request
R	Point where space heating gets priority
ON	ON
OFF	OFF
1	Minimum operation time for domestic water heating (initial 10 minutes [d-00]) (a)
2	Maximum operation time for domestic water heating (initial 30 minutes [d-01]) (b)
3	Interval minimum stop time for domestic water heating (initial 15 minutes [d-02])
N=4	No simultaneous operation
5	Timers for domestic water heating start
6	Timer for space heating start

Remark:

a. The minimum operation time is only valid when room temperature is more than 3°C lower as set point and set point J is reached.

b. The maximum operation time is only valid when room temperature is more than 0.5°C lower as set point and set point J is reached.

Part 6 - Test Operation

1. Test Operation..78
    - 1.1 Procedure and Outline 78
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    - 1.3 Additional Refrigerant Charge 81
    - 1.4 Operation when Power is Turned On 85
2. Outdoor Unit PC Board Layout 86
3. Field Setting...87
    - 3.1 Field Setting from remote control...87
    - 3.2 Field Setting from Outdoor Unit...115

1. Test Operation

1.1 Procedure and Outline

Follow the following procedure to conduct the initial test operation after installation.

1.1.1 Check Work Prior to Turn Power Supply On

Check the below items.
- Power wiring
- Control transmission wiring between units
- Earth wire

○ Is the power supply according unit specifications?
○ Have you finished a ductwork to drain?
○ Have you detach transport fitting?
○ Is the wiring performed as specified? Is the unit properly earthed?
○ Are the designated wires used?
○ Is the grounding work completed? Is the insulation resistance at least 1MΩ?
- Use a 500V megger tester to measure the insulation.
  Do not use a megger tester for low voltage circuits.

○ Are the setscrews of wiring not loose?
○ Is the electrical component box covered with an insulation cover completely?

⇩

Check on refrigerant piping

○ Is pipe size proper? (The design pressure of this product is 4.0MPa.)
○ Are pipe insulation materials installed securely?
Liquid and gas pipes need to be insulated. (Otherwise causes water condensation.)
○ Are respective stop valves on liquid and gas line securely open?

⇩

Check air tight test and vacuum drying

○ Have the air tight test and the vacuum drying been conducted according to the procedure in the installation manual?
- If the power has turned on before the vacuuming has been done, you must use the outdoor setting 2-21 to open all necessary values of indoor and outdoor unit. Only then complete vacuuming is possible.
  See “Settings of vacuuming mode” for more details.

⇩

Check on amount of refrigerant charge

○ Is refrigerant charged up to the specified amount?
If insufficient, charge the refrigerant from the service port of stop valve on the liquid side with outdoor unit in stop mode after turning power on.
○ Has the amount of refrigerant + extra refrigerant piping length charge been recorded on “Record Chart of Additional Refrigerant Charge Amount”?

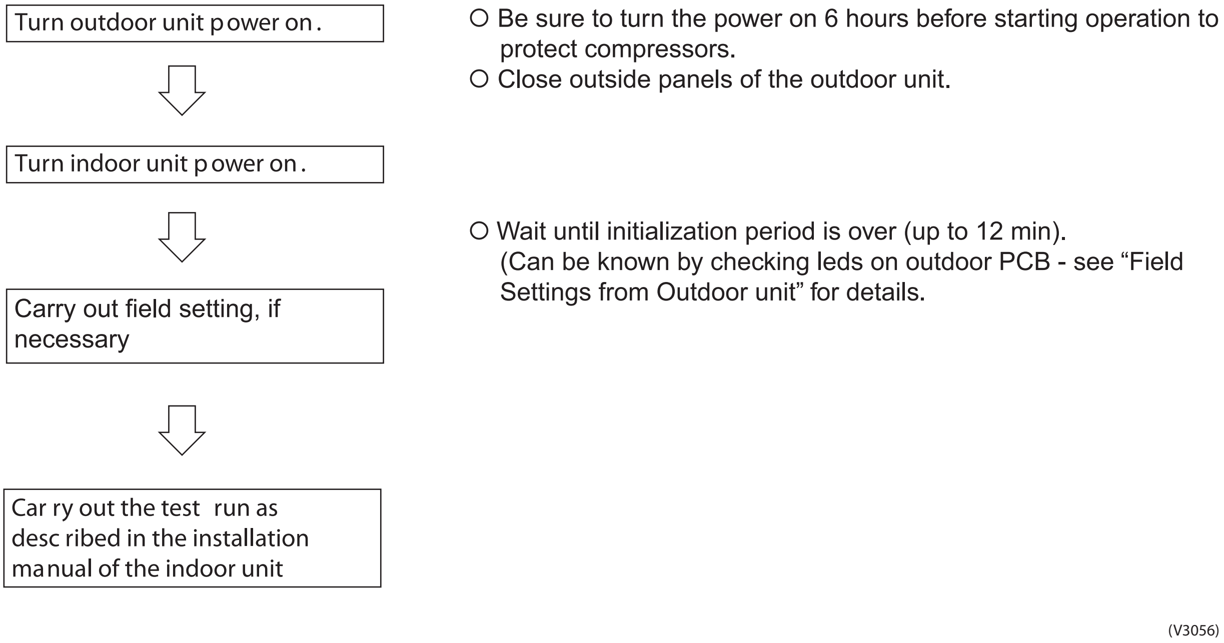
⇩

Check on water piping

○ Is the water pressure OK?
○ Is all the water removed?
○ Is there minimum 20 liters water in the system at all times?
○ Is there a bypass installed?
○ Are all the valves open, so water flow is guaranteed?
○ Is the pre-pressure of the expansion vessel set correctly?

(V3180)

1.1.2 Turn Power On


Turn outdoor unit power on.
Turn indoor unit power on.
Carry out field setting, if necessary
Carry out the test run as described in the installation manual of the indoor unit
(V3056)

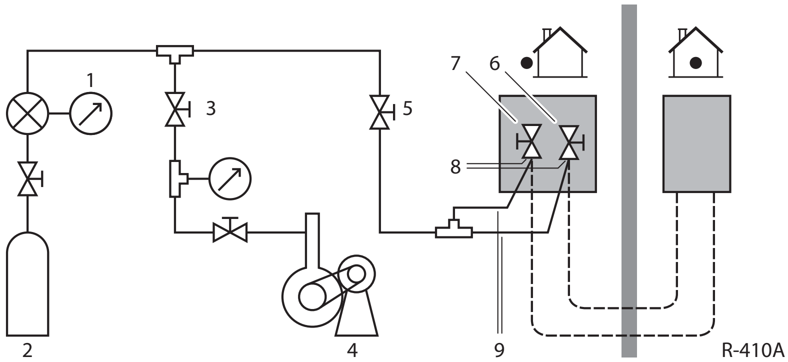
○ Be sure to turn the power on 6 hours before starting operation to protect compressors.

○ Close outside panels of the outdoor unit.

○ Wait until initialization period is over (up to 12 min).
(Can be known by checking leds on outdoor PCB - see “Field Settings from Outdoor unit” for details.

1.2 Air Tight Test and Vacuum Drying

- Air tight test: Make sure to use nitrogen gas.
- **Do this before powering the unit. (If the power has been turned on before the vacuuming has been done, first setting 2-21 must be used. See “Setting of Vacuuming Mode” on page 124.)**
- Setup:



1	Pressure reducing valve
2	Nitrogen
3	Siphon system
4	Vacuum pomp
5	Valve A
6	Gas line stop valve
7	Liquid line stop valve
8	Stop valve service port
9	Charge hose

The leak test must satisfy specification EN 378-2.

1. Vacuum leak test
    - Evacuate the system from the liquid and gas piping to –100.7 kPa (5 Torr).
    - Once reached, turn off the vacuum pump and check that the pressure does not rise for at least 1 minute.
    - Should the pressure rise, the system may either contain moisture (see vacuum drying below) or have leaks.
2. Pressure leak test
    - Break the vacuum by pressurizing with nitrogen gas to a minimum gauge pressure of 0.2 MPa (2 bar).
      Never set the gauge pressure higher than the maximum operation pressure of the unit, i.e. 4.0 MPa (40 bar).
    - Test for leaks by applying a bubble test solution to all piping connections.
      Make sure to use a recommended bubble test solution from your wholesaler.
      Do not use soap water, which may cause cracking of flare nuts (soap water may contain salt, which absorbs moisture that will freeze when the piping gets cold), and/or lead to corrosion of flared joints (soap water may contain ammonia which causes a corrosive effect between the brass flare nut and the copper flare).
3. Discharge all nitrogen gas.

- Pressurize the liquid and gas pipes to 4.0 MPa (40 bar) (do not pressurize more than 4.0 MPa (40 bar)). If the pressure does not drop within 24 hours, the system passes the test. If the pressure drops, check where the nitrogen leaks from.
- Vacuum drying: Use a vacuum pump which can evacuate to –100.7 kPa (5 Torr, –755 mm Hg). Connect the vacuum pump to both service port of the gas stop valve and the liquid stop valve to increase efficiency.
    1. Evacuate the system from the liquid and gas pipes by using a vacuum pump for more than 2 hours and bring the system to –100.7 kPa. After keeping the system under that condition for more than 1 hour, check if the vacuum gauge rises or not. If it rises, the system may either contain moisture inside or have leaks.
    2. Following should be executed if there is a possibility of moisture remaining inside the pipe (if piping work is carried out during the raining season or over a long period of time, rainwater may

enter the pipe during work).

After evacuating the system for 2 hours, pressurize the system to 0.05 MPa (vacuum break) with nitrogen gas and evacuate the system again using the vacuum pump for 1 hour to –100.7 kPa (vacuum drying). If the system cannot be evacuated to –100.7 kPa within 2 hours, repeat the operation of vacuum break and vacuum drying.

Then, after leaving the system in vacuum for 1 hour, confirm that the vacuum gauge does not rise.

If the indoor unit is changed by another indoor unit, do the above described leaktest again.

1.3 Additional Refrigerant Charge

- Refrigerant cannot be charged until field wiring has been completed.
- Refrigerant may only be charged after performing the leak test and the vacuum drying (see above).
- When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant (R-410A) is charged for outdoor unit, use (R-134a) for indoor unit.
- Refrigerant containers shall be opened slowly.
- Always use protective gloves and protect your eyes when charging refrigerant.
- When performing service on the unit requiring the refrigerant system to be opened, refrigerant must be evacuated according to local regulations.
- When the power is on, please close the front panel when leaving the unit.

To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.

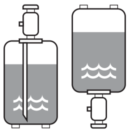
- This outdoor unit is factory charged with refrigerant and depending on pipe sizes and pipe lengths some systems require additional charging of refrigerant.
- In case re-charge is required, refer to the nameplate of the unit. The nameplate states the type of refrigerant and necessary amount.

Precautions when recharging/adding R-410A & recharging R-134a

Be sure to charge the specified amount of refrigerant in liquid state to the liquid pipe.

Since this refrigerant is a mixed refrigerant, adding it in gas form may cause the refrigerant composition to change, preventing normal operation.

- Before charging, check whether the refrigerant cylinder is equipped with a siphon tube or not.



Charge the liquid refrigerant with the cylinder in upright position.

Charge the liquid refrigerant with the cylinder in up-side-down position.

- Filling using a cylinder with a syphon attached.
- **Remark for R-134a:** Never recharge more than mentioned on factory name plate.

1.3.1 Important information regarding the refrigerant used

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere.

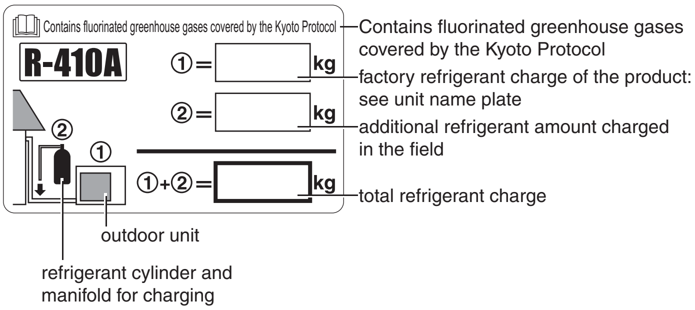
Refrigerant type: R-410A
GWP⁽¹⁾ value: 1975
(1) GWP = global warming potential

Please fill in with indelible ink,

- ① the factory refrigerant charge of the product,
- ② the additional refrigerant amount charged in the field and
- ① + ② the total refrigerant charge

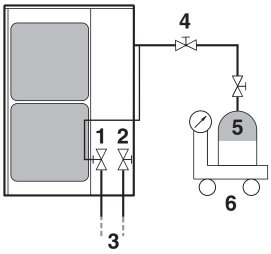
on the refrigerant charge label supplied with the product.

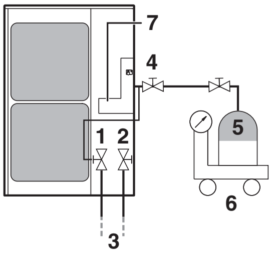
The filled out label must be adhered in the proximity of the product charging port (e.g. onto the inside of the service cover).


Contains fluorinated greenhouse gases covered by the Kyoto Protocol
R-410A
①=
kg
②=
kg
①+②=
kg
②
①
Contains fluorinated greenhouse gases covered by the Kyoto Protocol
factory refrigerant charge of the product: see unit name plate
additional refrigerant amount charged in the field
total refrigerant charge
outdoor unit
refrigerant cylinder and manifold for charging

1.3.2 Procedures for adding refrigerant

How to connect the tank?





1	Liquid line stop valve
2	Gas line stop valve
3	To indoor unit
4	Valve A
5	R-410A tank
6	Measuring instrument
7	Pipe fixing plate

Caution

- Automatic refrigerant charging is NOT POSSIBLE.
- Make sure to turn ON the power 6 hours before starting the operation. This is necessary to warm the crankcase by the electric heater.

Procedure: Charging while the outdoor unit is at a standstill

1. Determine the weight of refrigerant to be charged additionally.
   Piping length is the one way length of gas or liquid piping whichever is the longest.

   It is not necessary to charge additionally if the piping length is under 10 m.

   If the piping length is over 10 m please determine the additional amount of refrigerant to be charged using the table below.

   Table: Additional charging of refrigerant <unit: kg>

Refrigerant piping length				
3~10 m	**10~20 m**	**20~30 m**	**30~40 m**	**40~50 m**
(a)	0.54	1.08	1.62	2.16

   (a) Additional charge not required

   Complete recharging
   In case complete recharging is required (after a leak, etc.), refer to the table below to determine the necessary amount of refrigerant.

   Before recharging, make sure to execute vacuum drying of the internal piping of the unit as well. To do so, use the internal service port of the unit. Do NOT use the service ports located on the stop valve, since vacuum drying can not be performed properly from these ports.
   Outdoor units have 1 port on the piping. It is between the heat exchanger and the 4-way valve.

   Table: Total charging amount <unit: kg>

Refrigerant piping length				
3~10 m	**10~20 m**	**20~30 m**	**30~40 m**	**40~50 m**
4.5	5.0	5.6	6.1	6.7

2. After the vacuum drying is finished, open valve A (5) and charge the additional refrigerant in its liquid state through the service port on the liquid stop valve taking into account following instructions:
   - Turn on the power of the outdoor unit and indoor units.
   - Check that gas and liquid stop valves are closed.
   - Stop the compressor and charge the specified weight of refrigerant.

- ■ To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.

1.3.3 Check Operation

- During check operation, mount front panel to avoid misjudging.
- Check operation is mandatory for normal unit operation.
- During this check operation different temperature should be read out.
- A procedure for space heating and domestic water heating should be followed.
- If forced operation should be started during a test operation, the test run will be aborted.

Temperature read-out mode

On the remote controller, the actual temperatures can be displayed.

1. Push and hold the 🌡Ⓐ button for 5 seconds.
   The leaving water temperature is displayed (icons 👁 and ☀/❄ and ▯ are blinking).
2. Use the ⏲▲ and ⏲▼ buttons to display:
   - The entering water temperature (icons 👁 and ☀/❄ are blinking and the ▯ icon is flashing slowly).
   - The indoor temperature (icons 👁 and ☀/❄ are blinking).
   - The outdoor temperature (icons 👁 and ⌂🌡 are blinking).
   - The hot water supply tank temperature (icons 👁 and 🚿 are blinking).
3. Push the 🌡Ⓐ button again to leave this mode. If no button is pressed, the remote controller leaves the display mode after 10 seconds.

Procedure for space heating

1. Check the leaving water and entering water temperature through the remote controller read-out mode and write down the displayed values. See “Temperature read-out mode” on page 84.
2. **Push the ⚙TEST button 4 times so the TEST icon will be displayed.**
3. Perform the test as follows (when no action is performed, the user interface will return to normal mode after 10 seconds or by pressing the ⚙TEST button once):
   To test the space heating operation push the ☀❄⏻ button to start the test run operation.
4. The test run operation will end automatically after 30 minutes or when reaching the set temperature. The test run operation can be stopped manually by pressing the ⚙TEST button once. If there are misconnections or malfunctions, an error code will be displayed on the user interface. Otherwise, the user interface will return to normal operation.
5. To resolve the error codes, see "Error codes".
6. Check the leaving water and entering water temperature through the remote controller read-out mode and compare them with the values noted with step 1. After 20 minutes of operation an increase of the values should confirm the space heating operation.

Procedure for domestic water heating

1. Check the domestic hot water tank temperature through the remote controller read-out mode. See “Temperature read-out mode” on page 84.
2. **Push the 🚿 button for 5 seconds.**
   The 🚿 icon will start blinking with 1 second intervals.
3. Keep the unit operating for 20 minutes and check the domestic hot water tank temperature through the remote controller again.
   An increase of the value with 5°C should confirm the domestic water heating operation.
4. The operation will stop if the tank storage temperature has been reached.

1.4 Operation when Power is Turned On

1.4.1 When Turning On Power First Time

The unit cannot be run for up to 12 minutes to automatically set the master power and address (indoor-outdoor address, etc.).

Status

Outdoor unit	Test lamp H2P & H8P .... Blinks Can also be set during operation described above.
Indoor unit	If ON button is pushed during operation described above, the “UH” malfunction indicator blinks. (Returns to normal when automatic setting is complete.)

1.4.2 When Turning On Power the Second Time and Subsequent

Tap the RESET(BS5) button on the outdoor unit PC board. Operation becomes possible for about 2 minutes. If you do not push the RESET button, the unit cannot be run for up to 10 minutes to automatically set master power.

Status

Outdoor unit	Test lamp H2P & H8P .... Blinks Can also be set during operation described above.
Indoor unit	If ON button is pushed during operation described above, the operation lamp lights but the compressor does not operate. (Returns to normal when automatic setting is complete.)

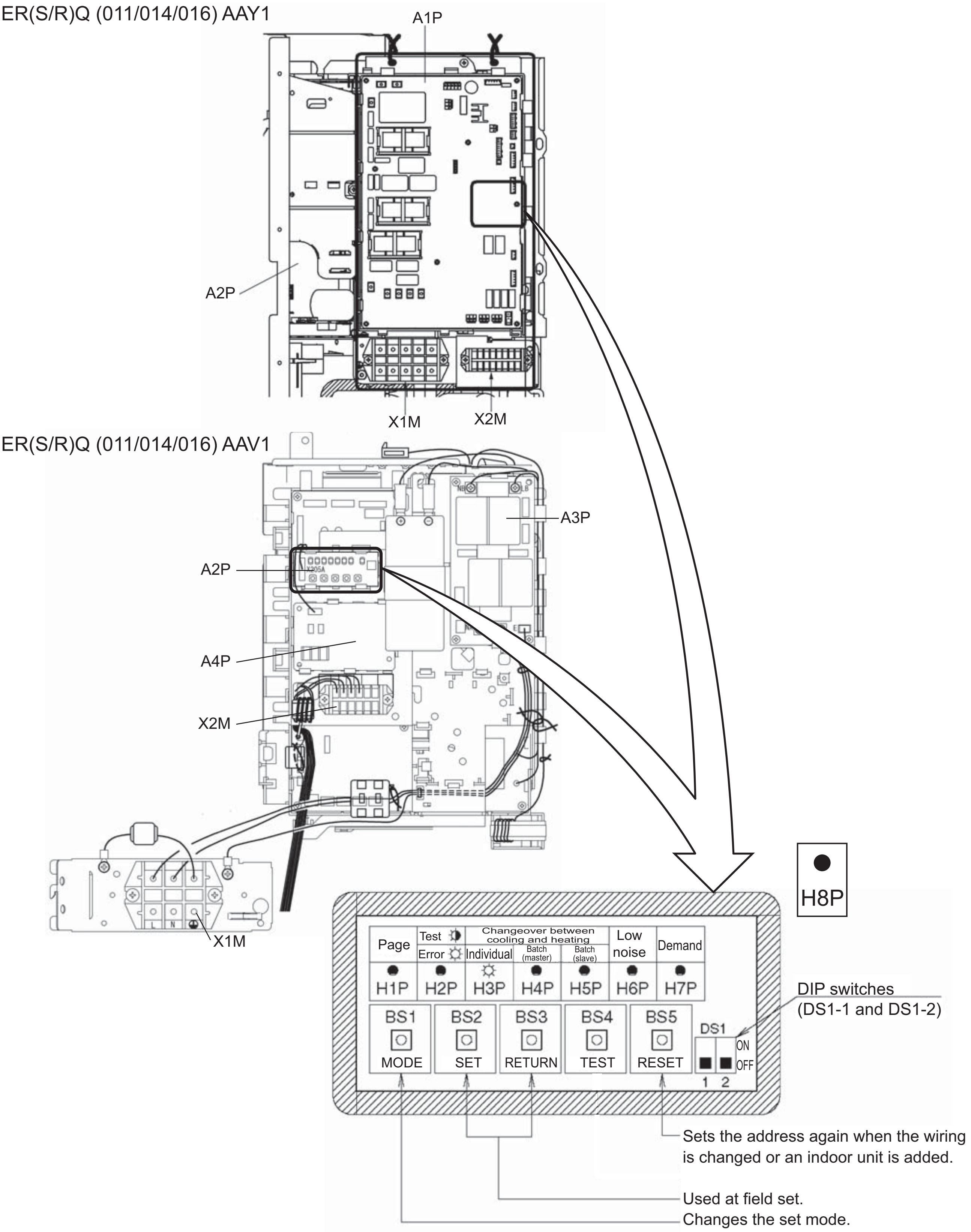
1.4.3 When an Indoor or Outdoor Unit PC Board has been Changed

Be sure to push and hold the RESET button for 5 seconds. If not, the addition cannot be recognized. In this case, the unit cannot be run for up to 12 minutes to automatically set the address (indoor-outdoor address, etc.)

Status

Outdoor unit	Test lamp H2P & H8P .... Blinks Can also be set during operation described above.
Indoor unit	If ON button is pushed during operation described above, the “UH” or “U4” malfunction indicator blinks. (Returns to normal when automatic setting is complete.)

2. Outdoor Unit PC Board Layout



Sets the address again when the wiring is changed or an indoor unit is added.

Used at field set.

Changes the set mode.

LED indicator status | ● : Turn off ☼ : Turn on ◐ : Flicker ✳ : Turn on or off

(The LED indicator status shown at left indicates the status at factory set.)

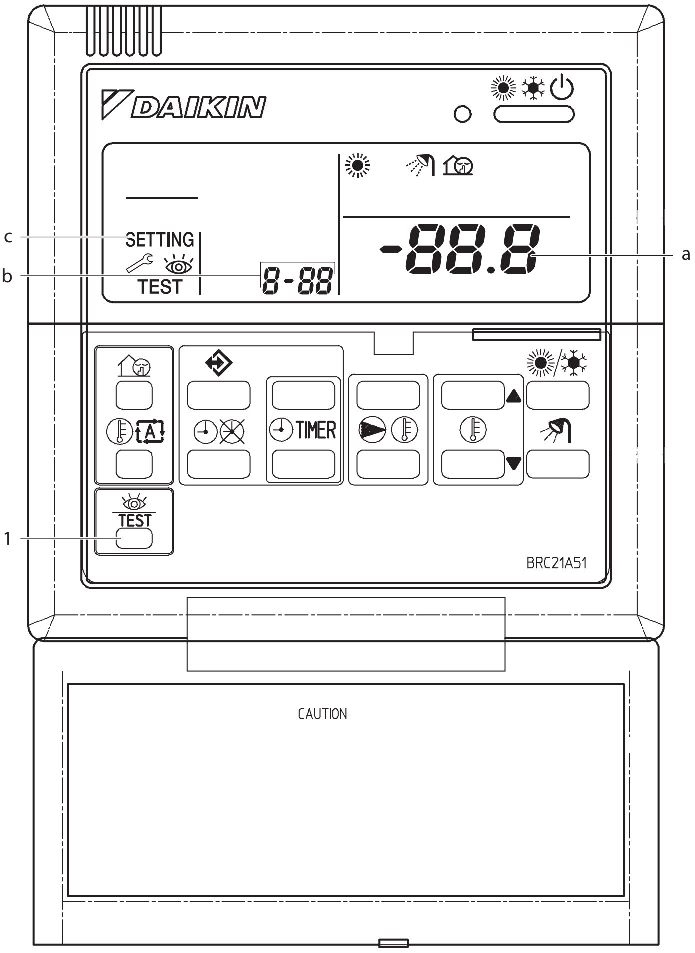
3. Field Setting

3.1 Field Setting from remote control

Individual function of indoor unit can be changed from the remote control. At the time of installation or after service inspection / repair, make the local setting in accordance with the following description. Wrong setting may cause malfunction.
(When optional accessory is mounted on the indoor unit, setting for the indoor unit may be required to change. Refer to information in the option handbook.)

3.1.1 Wired remote control

EKRUAHTA(BRC21A51)
EKRUAHTB(BRC21A52))



To change one or more field settings, proceed as follows.

1. Press the TEST button for a minimum of 5 seconds to enter FIELD SET MODE.
   The SETTING icon (c) will be displayed. The current selected field setting code is indicated 8-88 (b), with the set value displayed to the right -88.8 (a).
2. Press the ▲ button to select the appropriate field setting first code (8-).
3. Press the ▼ button to select the appropriate field setting second code (-88).
4. Press the TIMER ▲ button and TIMER ▼ button to change the set value of the select field setting.
5. Save the new value by pressing the ⊗ button.
6. Repeat step 2 through 4 to change other field settings as required.
7. When finished, press the TEST button to exit FIELD SET MODE.

Notes :

1. Changes made to a field setting are only stored when the ◷⊗ button is pressed. Pressing the TEST button, without pressing the ◷⊗ button before, will discard the change made.
2. When you save a field setting by pressing the ◷⊗ button, the complete field setting group will be saved. For example, when you save field setting 8-00, the other field settings of group 8 (8-01, 8-02, 8-03, 8-04) will be saved as well.
3. Before shipping, the set values have been set as shown in the field settings table.
4. When exiting FIELD SET MODE, "88" may be displayed on the remote controller LCD while the unit initializes itself.
5. When running through the field settings you may notice that there are some more field settings as mentioned in the field settings table. **THESE SETTINGS ARE NOT APPLICABLE AND MAY NOT BE CHANGED!**
6. If you want to leave the setting mode without saving, press the test button.

3.1.2 Setting Contents and Code No. – EKHBRD – Indoor unit

EKHBRD*AA

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
0	**Remote control setup**									
	00	User permission level					2	2~3	1	—
	01	Room temperature compensation value					0	–5~5	0.5	°C
	02	Not applicable. Do not change the default value.					1 (ON)	0/1	—	—
	03	Status: space heating schedule timer mode					1 (ON)	0/1	—	—
1	**Automatic storage timing for domestic water heating**									
	00	Status: night time storage					1 (ON)	0/1	—	—
	01	Night time storage start time					1:00	0:00~23:00	1:00	hour
	02	Status: day time storage					0 (OFF)	0/1	—	—
	03	Day time storage start time					15:00	0:00~23:00	1:00	hour
2	**Automatic setback function**									
	00	Status: setback operation					1 (ON)	0/1	—	—
	01	Setback operation start time					23:00	0:00~23:00	1:00	hour
	02	Setback operation stop time					5:00	0:00~23:00	1:00	hour
3	**Weather dependent set point**									
	00	Low ambient temperature (Lo_A)					–10	–20~5	1	°C
	01	High ambient temperature (Hi_A)					15	10~20	1	°C
	02	Set point at low ambient temperature (Lo_Ti)					70	25~80	1	°C
	03	Set point at high ambient temperature (Hi_Ti)					45	25~80	1	°C
4	**Disinfection function**									
	00	Status: disinfection operation					1 (ON)	0/1	—	—
	01	Disinfection operation day selection					Fri	Mon~Sun	—	—
	02	Disinfection operation start time					23:00	0:00~23:00	1:00	hour
5	**Automatic setback and disinfection set point**									
	00	Set point: disinfection operation temperature					70	60~70	5	°C
	01	Disinfection operation time duration					10	5~60	5	min
	02	Leaving water setback temperature					5	0~10	1	°C
	03	Room setback temperature					18	17~23	1	°C
6	**Option setup**									
	00	Domestic hot water tank installed					0 (OFF)	0/1	—	—
	01	Optional room thermostat installed					0 (OFF)	0/1	—	—
	02	Backup heater kit activation					0 (OFF)	0/1	—	—
	03	Solar kit activation					0 (OFF)	0/1	—	—
	04	Benefit kWh power supply mode					0	0/2	1	—

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
7	**Option setup**									
	00	Optional bottom plate heater installed					0 (OFF)	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Multiple set point pattern					0 (A)	0/1	—	—
	03	Multiple set point 1					0 (OFF)	0/1	—	—
	04	Multiple set point 2					0 (OFF)	0/1	—	—
8	**Option setup**									
	00	Remote controller temperature control					1 (ON)	0/1	—	—
	01	Status: automatic restart function					1 (ON)	0/1	—	—
	02	Emergency mode					0 (OFF)	0/1	—	—
	03	Status: low noise level					1	1~3	1	—
	04	Status: freeze up prevention					0	0~2	1	—
9	**Automatic temperature compensation**									
	00	Leaving water temperature compensation value					0	–5~5	0.5	°C
	01	Domestic hot water tank compensation value					0	–5~5	0.5	°C
	02	Thermo ON/OFF admission					0	–5~5	0.5	°C
A	**Option setup**									
	00	Not applicable. Do not change the default value.					0	0~2	1	—
	01	Not applicable. Do not change the default value.					0	0~2	1	—
	02	Set point: required temperature difference for leaving and returning water					10	5~15	1	°C
	03	Set point: multiple set point 1 required temperature value					35	25~80	1	°C
	04	Set point: multiple set point 2 required temperature value					65	25~80	1	°C
B	**Domestic hot water set points**									
	00	Set point: reheat minimum temperature					35	35~65	1	°C
	01	Set point: reheat maximum temperature					45	35~75	1	°C
	02	Status: weather dependent domestic water heating					1 (ON)	0/1	—	—
	03	Set point: storage temperature					70	45~75	1	°C

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
C	**Leaving water temperature limits**									
	00	Set point: leaving water maximum temperature					80	37~80	1	°C
	01	Set point: leaving water minimum temperature					25	25~37	1	°C
	02	Not applicable. Do not change the default value.					20	18~22	1	°C
	03	Not applicable. Do not change the default value.					5	5~18	1	°C
D	**Domestic water heating retention times**									
	00	Set point: minimum time for domestic water heating					10	5~20	1	—
	01	Set point: maximum time for domestic water heating					30	10~60	5	—
	02	Set point: interval minimum stop time of domestic water heating					15	5~30	5	—
E	**Service mode**									
	00	Vacuum mode					0	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	03	Not applicable. Do not change the default value.					1	0~2	1	—
	04	Pump only operation					0	0~2	1	—

EKHBRD*AB/AC

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
0	**Remote control setup**									
	00	User permission level					2	2~3	1	—
	01	Room temperature compensation value					0	–5~5	0.5	°C
	02	Not applicable. Do not change the default value.					1 (ON)	0/1	—	—
	03	Status: space heating schedule timer mode					1 (ON)	0/1	—	—
1	**Automatic storage timing for domestic water heating**									
	00	Status: night time storage					1 (ON)	0/1	—	—
	01	Night time storage start time					1:00	0:00~23:00	1:00	hour
	02	Status: day time storage					0 (OFF)	0/1	—	—
	03	Day time storage start time					15:00	0:00~23:00	1:00	hour
2	**Automatic setback function**									
	00	Status: setback operation					1 (ON)	0/1	—	—
	01	Setback operation start time					23:00	0:00~23:00	1:00	hour
	02	Setback operation stop time					5:00	0:00~23:00	1:00	hour
3	**Weather dependent set point**									
	00	Low ambient temperature (Lo_A)					–10	–20~5	1	°C
	01	High ambient temperature (Hi_A)					15	10~20	1	°C
	02	Set point at low ambient temperature (Lo_Ti)					70	25~80	1	°C
	03	Set point at high ambient temperature (Hi_Ti)					45	25~80	1	°C
4	**Disinfection function**									
	00	Status: disinfection operation					1 (ON)	0/1	—	—
	01	Disinfection operation day selection					Fri	Mon~Sun	—	—
	02	Disinfection operation start time					23:00	0:00~23:00	1:00	hour
5	**Automatic setback and disinfection set point**									
	00	Set point: disinfection operation temperature					70	60~70	5	°C
	01	Disinfection operation time duration					10	5~60	5	min
	02	Leaving water setback temperature					5	0~10	1	°C
	03	Room setback temperature					18	17~23	1	°C
6	**Option setup**									
	00	Domestic hot water tank installed					0 (OFF)	0/1	—	—
	01	Optional room thermostat installed					0 (OFF)	0/1	—	—
	02	Backup heater kit activation					0 (OFF)	0/1	—	—
	03	Solar kit activation					0 (OFF)	0/1	—	—
	04	Benefit kWh power supply mode					0	0/2	1	—
7	**Option setup**									
	00	Optional bottom plate heater installed					1 (ON)	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Multiple set point pattern					0 (A)	0/1	—	—
	03	Multiple set point 1					0 (OFF)	0/1	—	—
	04	Multiple set point 2					0 (OFF)	0/1	—	—

First code	Second code	Setting name	Installer setting at variance with default value				Default value	Range	Step	Unit
			Date	Value	Date	Value				
8	**Option setup**									
	00	Remote controller temperature control					1 (ON)	0/1	—	—
	01	Backup heater kit optional setting					1 (ON)	0/1	—	—
	02	Emergency mode					0 (OFF)	0/1	—	—
	03	Status: low noise level					1	1~3	1	—
	04	Status: freeze up prevention					0	0~2	1	—
9	**Automatic temperature compensation**									
	00	Leaving water temperature compensation value					0	–5~5	0.5	°C
	01	Domestic hot water tank compensation value					0	–5~5	0.5	°C
	02	Thermo ON/OFF admission					0	–5~5	0.5	°C
A	**Option setup**									
	00	Current limitation					0	0~2	1	—
	01	Not applicable. Do not change the default value.					0	0~2	1	—
	02	Set point: required temperature difference for leaving and returning water					10	5~15	1	°C
	03	Set point: multiple set point 1 required temperature value					35	25~80	1	°C
	04	Set point: multiple set point 2 required temperature value					65	25~80	1	°C
B	**Domestic hot water set points**									
	00	Set point: reheat minimum temperature					35	35~65	1	°C
	01	Set point: reheat maximum temperature					45	35~75	1	°C
	02	Status: weather dependent domestic water heating					1 (ON)	0/1	—	—
	03	Set point: storage temperature					70	45~75	1	°C
	04	Automatic maximum domestic hot water storage temperature					70	55~75	1	°C
C	**Leaving water temperature limits**									
	00	Set point: leaving water maximum temperature					80	37~80	1	°C
	01	Set point: leaving water minimum temperature					25	25~37	1	°C
	02	Not applicable. Do not change the default value.					20	18~22	1	°C
	03	Not applicable. Do not change the default value.					5	5~18	1	°C
D	**Domestic water heating retention times**									
	00	Set point: minimum time for domestic water heating					10	5~20	1	—
	01	Set point: maximum time for domestic water heating					30	10~60	5	—
	02	Set point: interval minimum stop time of domestic water heating					15	5~30	5	—
E	**Service mode**									
	00	Vacuum mode					0	0/1	—	—
	01	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	02	Not applicable. Do not change the default value.					0 (OFF)	0/1	—	—
	03	Not applicable. Do not change the default value.					1	0~2	1	—
	04	Pump only operation					0	0~2	1	—

3.1.3 Detailed Explanation of Setting Modes

[0] Remote control setup

First code	Second code	Setting name	Default value	Range	Step	Unit
0	**Remote control setup**					
	00	User permission level	2	2~3	1	—
	01	Room temperature compensation value	0	–5~5	0.5	°C
	03	Status: space heating schedule timer mode	1 (ON)	0/1	—	—

- **[0-00] User permission level**

The remote controller can be programmed to make certain buttons and functions unavailable for the user. There are 2 permission levels defined. Both levels (level 2 and level 3) are basically the same, the only difference is that for level 3 no water temperature settings are possible (see table below).

	Permission	
	level 2	level 3
Operation ON/OFF	Operable	Operable
Domestic water heating operation ON/OFF	Operable	Operable
Setting the leaving water temperature	Operable	—
Setting the room temperature	Operable	Operable
Quiet mode ON/OFF	—	—
Weather dependent set point operation ON/OFF	Operable	—
Setting the clock	—	—
Programming the schedule timer	—	—
Schedule timer operation ON/OFF	Operable	Operable
Field settings	—	—
Error code display	Operable	Operable
Test operation	—	—

By default no level is defined so all buttons and functions are operable (no level enabled). The actual permission level is determined by field setting. For permission level 2, set field setting [0-00] is to 2, for permission level 3, set field setting [0-00] to 3.
Once the field setting is set, the chosen permission level is not yet active. Enabling the selected permission level is done by simultaneously pressing buttons 🕘▲ and 🕘▼ immediately followed by simultaneously pressing buttons ⌂ and 🌡Ⓐ, and keeping all 4 buttons pressed for at least 5 seconds. Note that no indication on the remote controller is given. After the procedure the blocked buttons will not be available anymore.
Deactivating the selected permission level is done on the same way. Here the default level becomes active again. All buttons and functions are operable.

- **[0-01] Room temperature compensation value**

If needed, it is possible to adjust some thermistor value of the unit by a correction value. This can be used as countermeasure for thermistor tolerances or capacity shortage.
The compensated temperature (= measured temperature plus compensation value) is then used for controlling the system and will be displayed in the temperature read-out mode. See also "[9] Automatic temperature compensation" setting for compensation values for leaving water temperature and domestic hot water temperature.

- **[0-03] Status: defines whether the ON/OFF instruction can be used in the schedule timer for space heating.**

The schedule timer for space heating can be programmed on 2 different ways: based on the temperature set point (both leaving water temperature and room temperature) and based on the ON/OFF instruction.

Notes : By default space heating based on temperature set point (method 1) is enabled, so only temperature shifts

are possible (no ON/OFF instruction). The system keeps operating.
Advantage of this method is that you can simply switch off the space heating operation by pushing the ☼✻⏻ button without disabling the automatic domestic hot water storage operation (e.g. during summertime when no space heating is required).

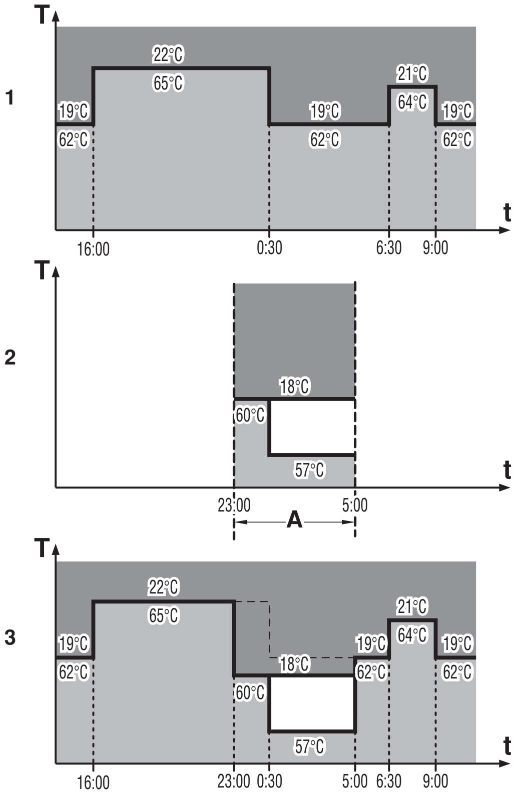
In the following tables both methods on how to interpret the schedule timer are shown.

Method 1	Space heating based on temperature set point[a]
During operation	During schedule timer operation the operation LED is lit continuously.
When pushing the ☼✻⏻ button	The schedule timer for space heating will stop and will not start again. The controller will be switched off (operation LED will stop working). However, the schedule timer icon will stay displayed which means that the domestic water heating stays enabled.
When pushing the ⊗/◴ button	The schedule timer for space heating **and** domestic water heating along with the quiet mode will be stopped and will not start again. The schedule timer icon will not be displayed anymore.

(a) For leaving water temperature and/or room temperature see leaving water temperature control (setting 8-00).

Operation example: Schedule timer based on temperature set points.

When setback function is enabled, the setback operation will have priority over the scheduled action in the schedule timer setting 2.



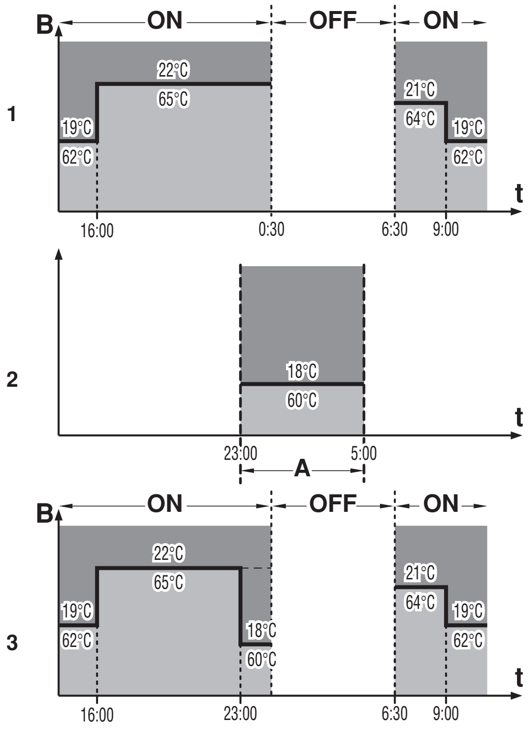
1	Schedule timer
2	Setback function
3	When both setback function and schedule timer are enabled
A	Setback function
t	Time
T	Temperature set point
▩	Room temperature
▨	Leaving water temperature

Remark: Room temperature and leaving water temperature have no fix relationship. Both temperatures can be adjusted independently.

Method 2	Space heating based on ON/OFF instruction
During operation	When the schedule timer switches space heating OFF, the controller will be switched off (operation LED will stop working). Note that this has no influence on the domestic water heating.
When pushing the ☀❄⏻ button	The schedule timer for space heating will stop (when active at that moment) and will start again at the next scheduled ON function. The "last" programmed command overrules the "preceding" programmed command and will remain active until the "next" programmed command occurs. Example: imagine the actual time is 17:30 and actions are programmed at 13:00, 16:00 and 19:00. The "last" programmed command (16:00) overruled the "previous" programmed command (13:00) and will remain active until the "next" programmed command (19:00) occurs. So in order to know the actual setting, one should consult the last programmed command. It is clear that the "last" programmed command may date from the day before. Refer to the operation manual. The controller will be switched off (operation LED will stop working). However the schedule timer icon will stay displayed which means that the domestic heating stays enabled.
When pushing the ⊗/◷ button	The schedule timer for space heating **and** domestic water heating along with the quiet mode will be stopped and will not start again. The schedule timer icon will not be displayed anymore.

Operation example: Schedule timer based on ON/OFF instruction.

When setback function is enabled, the setback operation will have priority over the scheduled action in the schedule timer if ON instruction is active. If OFF instruction is active this will have priority over the setback function. At any time the OFF instruction will have the highest priority.



1	Schedule timer
2	Setback function
3	When both setback function and schedule timer are enabled
A	Setback function
B	ON/OFF instruction
t	Time
T	Temperature set point
▓	Room temperature
░	Leaving water temperature

[1] Automatic storage timing for domestic water heating

First code	Second code	Setting name	Default value	Range	Step	Unit
1	**Automatic storage timing for domestic water heating**					
	00	Status: night time storage	1 (ON)	0/1	—	—
	01	Night time storage start time	1:00	0:00~23:00	1:00	hour
	02	Status: day time storage	0 (OFF)	0/1	—	—
	03	Day time storage start time	15:00	0:00~23:00	1:00	hour

In this mode, the indoor unit will deliver hot water to the domestic hot water tank based on the daily fixed pattern. This mode will continue until storage temperature is reached, no times are involved.

Automatic storage is the advised domestic hot water mode. In this mode water heats up during the night (when space heating requirements are lower) until the storage set point. The heated water is stored in the domestic hot water tank at a higher temperature so it can fulfil the domestic hot water requirements throughout the day.

The storage temperature set point and timing are field settings.

- **[1-00]** Status: defines whether the domestic water heating (storage mode) during night is enabled (1) or not (0).
- **[1-01]** Start time: time of the night at which the domestic water should be heated. The ending time will variate for each system.
- **[1-02]** Status: defines whether the domestic water heating (storage mode) during daytime is enabled (1) or not (0).
- **[1-03]** Start time: time of the day at which the domestic water should be heated. The ending time will variate for each system.

Notes :

1. Make sure the domestic hot water is only heated up to the domestic hot water temperature you require.
   Start with a low domestic hot water storage temperature set point, and only increase if you feel that the domestic hot water supply temperature is not sufficient for your needs (this depends on your water using pattern).
2. Make sure the domestic hot water is not heated unnecessary. Start with activating automatic storage during night (default setting). If it seems that the domestic hot water night storage operation is not sufficient for your needs, an additional storage during daytime can be set.
3. For energy-saving purposes, it is advised to enable the weather dependent domestic water heating. Refer to setting “[b-02] Status: defines whether the weather dependent domestic water heating is turned ON (1) or OFF (0).” on page 110.
4. Manual storage is possible: to activate push 5 seconds on the 🚿 button. The 🚿 icon starts to blink, the water will be heated up till storage set point (one time action). It can also be stopped manually by pushing the 🚿 button.
5. Be aware that despite the automatic storage is a pre-programmed schedule timer, it is only active when the schedule timer is enabled. This means that you have to push the ⊠◷ button and confirm that the ◷ is displayed to make sure that the automatic storage will operate.

Refer to "[b] Domestic hot water set points" for temperature set points.

[2] Automatic setback function

First code	Second code	Setting name	Default value	Range	Step	Unit
2	**Automatic setback function**					
	00	Status: setback operation	1 (ON)	0/1	—	—
	01	Setback operation start time	23:00	0:00~23:00	1:00	hour
	02	Setback operation stop time	5:00	0:00~23:00	1:00	hour

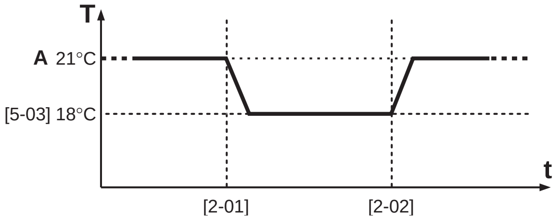
Setback function provides the possibility to lower the room temperature. The setback function can for instance be activated during the night because the temperature demands during night and day are not the same.

Notes :

1. By default the setback function is enabled, if it’s not needed, it should be disabled.
2. The setback function can be combined with the automatic weather dependent set point operation.
3. Setback function is an automatic daily scheduled function.
4. It is advised to set the start time of automatic storage during night [1-01] on the moment that the setback function starts [2-01].

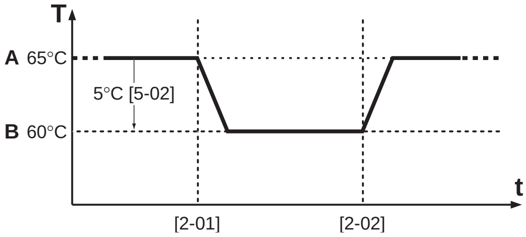
- **[2-00]** Status: defines whether the setback function is turned ON (1) or OFF (0)
- **[2-01]** Start time: time at which setback is started
- **[2-02]** Stop time: time at which setback is stopped

* Setback operation for room temperature control



A	Normal room temperature set point
t	Time
T	Temperature
[5-03]	Room setback temperature (actual temperature)

* Setback operation for leaving water control



A	Normal leaving water temperature set point
B	Leaving water setback temperature
t	Time
T	Temperature
[5-02]	Leaving water setback value (shift value)

Notes :

1. In setback operation for room temperature control, immediately a setback temperature is set.
2. In setback operation for leaving water control, a shift down value is chosen. This value should be lowered from the normal set point.

[3] Weather dependent set point

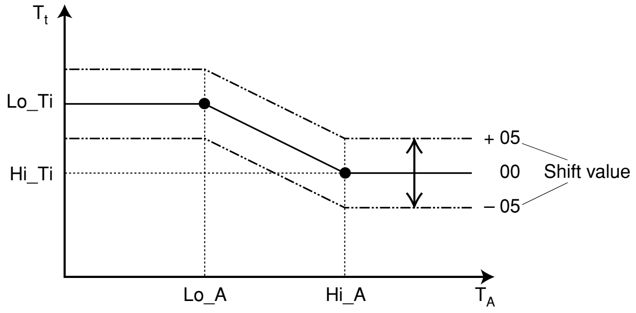
First code	Second code	Setting name	Default value	Range	Step	Unit
3	**Weather dependent set point**					
	00	Low ambient temperature (Lo_A)	–10	–20~5	1	°C
	01	High ambient temperature (Hi_A)	15	10~20	1	°C
	02	Set point at low ambient temperature (Lo_Ti)	70	25~80	1	°C
	03	Set point at high ambient temperature (Hi_Ti)	45	25~80	1	°C

When weather dependent operation is active, the leaving water temperature is determined automatically depending on the outdoor temperature: colder outdoor temperatures will result in warmer water and vice versa. The unit has a floating set point. Activating this operation will result in a lower power consumption than use with a manually fixed leaving water set point.

During weather dependent operation, the user has the possibility to shift up or down the target water temperature by a maximum of 5°C. This "Shift value" is the temperature difference between the temperature set point calculated by the controller and the real set point. E.g. a positive shift value means that the real temperature set point will be higher than the calculated set point.

It is advised to use the weather dependent set point because it adjusts the water temperature to the actual needs for space heating. It will prevent the unit from switching too much between thermo ON operation and thermo OFF operation when using the remote controller room thermostat or external room thermostat.

Note : During this operation, instead of showing the water temperature set point, the controller shows the shift value which can be set by the user.



$\mathbf{T_t}$	Target water temperature
$\mathbf{T_A}$	Ambient (outdoor) temperature
Shift value	= Shift value

- **[3-00]** Low ambient temperature (Lo_A): low outdoor temperature.
- **[3-01]** High ambient temperature (Hi_A): high outdoor temperature.
- **[3-02]** Set point at low ambient temperature (Lo_Ti): the target outgoing water temperature when the outdoor temperature equals or drops below the low ambient temperature (Lo_A).
  Note that the Lo_Ti value should be higher than Hi_Ti, as for colder outdoor temperatures (i.e. Lo_A) warmer water is required.
- **[3-03]** Set point at high ambient temperature (Hi_Ti): the target outgoing water temperature when the outdoor temperature equals or rises above the high ambient temperature (Hi_A).

  Note that the Hi_Ti value should be lower than Lo_Ti, as for warmer outdoor temperatures (i.e. Hi_A) less warm water suffices.

Note : If by mistake the value of [3-03] is set higher than the value of [3-02], the value of [3-03] will always be used.

[4] Disinfection function

First code	Second code	Setting name	Default value	Range	Step	Unit
4	**Disinfection function**					
	00	Status: disinfection operation	1 (ON)	0/1	—	—
	01	Disinfection operation day selection	Fri	Mon~Sun	—	—
	02	Disinfection operation start time	23:00	0:00~23:00	1:00	hour

This mode will disinfect the domestic hot water tank by periodically heating the domestic water to a specific temperature.

Note : If a domestic hot water tank is installed, the disinfection function is enabled by default.

- **[4-00]** Status: defines whether the disinfection function is turned ON (1) or OFF (0).
- **[4-01]** Operation interval: day of the week at which the domestic water should be heated.
- **[4-02]** Start time: time at which the disinfection operation is started.

Even if all schedule timers are de-activated and there is no reheat function active, the disinfection function will operate if a domestic hot water tank is installed and field setting [4-00] is set to ON.

The disinfection function field settings must be configured by the installer according to national and local regulations.

Refer to “[5] Automatic setback and disinfection set point” on page 102 for temperature set points.

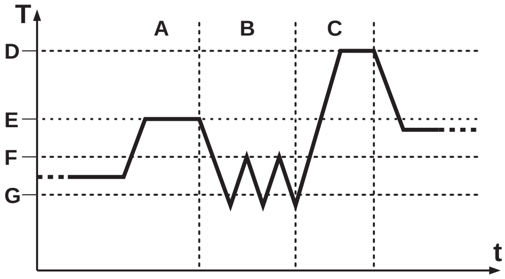
Note : This function may be disabled if the set point storage temperature is higher than the disinfection set point.

[5] Automatic setback and disinfection set point

First code	Second code	Setting name	Default value	Range	Step	Unit
5	**Automatic setback and disinfection set point**					
	00	Set point: disinfection operation temperature	70	60~75	5	°C
	01	Disinfection operation time duration	10	5~60	5	min
	02	Leaving water setback temperature	5	0~10	1	°C
	03	Room setback temperature	18	17~23	1	°C

See also “[4] Disinfection function” on page 101 for more information about the disinfection operation.

- **[5-00]** Set point: disinfection water temperature to be reached.
- **[5-01]** Interval: time period defining how long the disinfection temperature set point should be maintained.



A	Storage operation (if activated)
B	Reheat operation (if activated)
C	Disinfection operation (if activated)

Field settings

D	Disinfection operation temperature [5-00] (e.g. 70°C)
E	Hot water storage temperature [b-03] (e.g. 60°C)
F	Reheat maximum water temperature [b-01] (e.g. 45°C)
G	Reheat minimum water temperature [b-00] (e.g. 35°C)
t	Time
T	Domestic hot water tank temperature

Notes :

1. Reheat temperature should have lower value than storage temperature.
2. If storage temperature is higher than the disinfection temperature and if this value is high enough according national and local regulations, you can disable the disinfection function.

- **[5-02]** Leaving water setback temperature.
- **[5-03]** Room setback temperature.

Note : More details about setback function can be found in setting [2].

[6] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
6	**Option setup**					
	00	Domestic hot water tank installed	0 (OFF)	0/1	—	—
	01	Optional room thermostat installed	0 (OFF)	0/1	—	—
	04	Benefit kWh power supply mode	0	0/2	1	—

- **[6-00]** Domestic hot water tank option
  If the domestic hot water tank is installed, its operation must be enabled by field setting. Default [6-00] = 0 which means no tank is installed. Set [6-00] to 1 if the optional domestic hot water tank is installed.

Note : When enabling the domestic hot water tank option be aware that the advised default settings become active:

- **[1-00]** = 1 = automatic night storage
- **[4-00]** = 1 = disinfection function

- **[6-01]** External room thermostat option
  If the optional external room thermostat is installed, its operation must be enabled by field setting. Default [6-01] = 0, which means no external room thermostat is installed. Set [6-01] to 1 if the optional external room thermostat is installed.
  The external room thermostat only gives an ON/OFF signal to the heat pump based on the room temperature. Because it does not give continuous feedback information to the heat pump, it is supplementary to the remote controller room thermostat function. To have a good control of the system and avoiding frequent ON/OFF it is advised to use the automatic weather dependent set point operation.

Note : By using an external room thermostat, the smart logic of the standard remote controller is overruled.

- **[6-02]** Heater kit
  Once installed, you can activate the heater kit by changing field setting [6-02]=1.
  From that moment on, the heat pump system will take the heater kit into account whilst deciding operation. When the heater is actually operating, the heater symbol is shown on the remote controller. There is no step 1-2 indication.
  For more information see “Part 9 - External Backup Heater Kit” on page 255.
- **[6-03]** Solar support
  For more information refer to the EKHWP installation manual.
- **[6-04]** Benefit kWh rate power supply mode
  If benefit kWh rate power supply is used, the mode must be selected. Default [6-04] = 0 which means no benefit kWh rate power supply is used.
  Set [6-04] to 1 to use benefit kWh rate power supply mode 1 (normally closed contact which will open when the power supply is interrupted), or set [6-04] to 2 to use benefit kWh rate power supply mode 2 (normally opened contact which will close when the power supply is interrupted).

[7] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
7	**Option setup**					
	00	Optional bottom plate heater installed	0 (OFF)	0/1	—	—
	02	Multiple set point pattern	0 (A)	0/1	—	—
	03	Multiple set point 1	0 (OFF)	0/1	—	—
	04	Multiple set point 2	0 (OFF)	0/1	—	—

- **[7-00]** Bottom plate heater option
  An optional bottom plate heater can be installed in your outdoor unit. In case an ERRQ* outdoor unit (special model with freeze-up countermeasures) is installed, the unit will have the bottom plate heater already standard installed.
  If the bottom plate heater is installed, its operation must be enabled by field setting. Default [7-00] = 0 which means no bottom plate heater is installed. Set [7-00] to 1 if the bottom plate heater is installed.
- **[7-02]** Select multiple set point pattern A or B
  - Multi set point control according pattern A
    During normal operation, domestic water heating and space heating modes are separated and activated intermittent to fulfil a simultaneous request. Therefor multiple set point pattern A can be configured to allow simultaneous domestic water and space heating without intermission.
  - Multi set point control according pattern B
    The basic setup of multiple set point pattern B is the same as a normal classic design, so AGAIN no domestic water heating and space heating is possible simultaneously. Multiple set point pattern B is focussed on space heating operation and allows using multiple water set points in combination with the remote controller or external room thermostat. The configuration of pattern B allows space heating set points and the domestic hot water set point.
- **[7-03]** Activation for multiple set point 1
- **[7-04]** Activation for multiple set point 2

[8] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
8	**Option setup**					
	00	Remote controller temperature control	1 (ON)	0/1	—	—
	01	Automatic restart function/Backup heater optional setting	1 (ON)	0/1	—	—
	02	Emergency operation	0 (OFF)	0/1	—	—
	03	Status: low noise level	1	1~3	1	—
	04	Status: freeze up prevention	0	0~2	1	—

- **[8-00]** Remote controller temperature control - leaving water control
  When using the remote control delivered with the unit, 2 types of temperature control are possible. Default [8-00] = 1 which means that the remote controller is used as room thermostat, so the remote controller can be placed in the living room to control the room temperature. Set [8-00] to 0 to use the unit in leaving water temperature control.

Notes :

1. In leaving water control: the heating will be activated as required by the water temperature set point. The set point can be set manually, through the schedule timer or weather dependent (automatic). The temperature range is between 25°C and 80°C and can be set by ▯🌡▲ and ▯🌡▼ buttons.
2. Leaving water control is not allowed when multi set point control according pattern B is used.

- **[8-01]**
  For EKHBRD*AA: **[8-01]** Auto restart. For EKHBRD*AB/AC auto restart can not be disabled. When a power failure occurred and the power returns to the unit, the system will automatically restore it's settings and restart. This is the default setting [8-01] = 1. To disable this auto restart function, set [8-01] to 0.

Note :

When power returns after a power supply failure, the auto restart function reapplies the remote controller settings at the time of the power supply failure. It is therefore recommended to leave the auto restart function enabled. Note that with the function disabled the schedule timer will not be activated when power returns to the unit after a power supply failure. Press the ◷⊗ button to enable the schedule timer again.

For EKHBRD*AB/AC: **[8-01]** Backup heater optional setting

[8-01]=0 (default)
During benefit kWh rate power supply mode the backup heater will not operate. No autmatic heat pump operation stop is performed at lower ambient temperatures.

[8-01]=1
During benefit kWh rate power supply mode the backup heater will operate automatically in emergency mode. If the ambient temperatures is lower than -25°C, the heat pump operation will stop and the unit will atumatically change to emergency operation.
For more information about the backup heater, refer to “Part 9 - External Backup Heater Kit” on page 255.

- **[8-02]** Emergency mode
  During emergency mode, heating is only done by the heater kit, not by the heat pump.
  Activation of emergency mode is done by changing field setting [8-02]=1.
  Activating the emergency mode will stop the heat pump operation. The pump of the indoor unit will be started, but heating itself is done by the heaeter kit. If there are no error conditions in leaving or returning water thermistor, the heater kit can start to follow emergency ooperation.

Note : Before activating emergency operation, be sure to activate theat hetaer kit. The heater will stay in emergency mode unit the field setting is set back to default [8-02]=0.

- **[8-03]** Quiet mode

  The unit has a quiet mode functionality for which 3 levels can be selected:
  - **[8-03]** = 1 low noise level 1 (default)
  - **[8-03]** = 2 low noise level 2
  - **[8-03]** = 3 low noise level 3

  Activating this quiet mode is done by pushing the QUIET MODE button on the remote controller or through the schedule timer.

- **[8-04]** Freeze-up prevention

  The unit has a freeze-up prevention functionality for which 3 levels can be selected:
  - **[8-04]** = 0 prevention level 0 (default: no prevention)
  - **[8-04]** = 1 prevention level 1
  - **[8-04]** = 2 prevention level 2

  The freeze-up prevention is only active when the unit is in thermo OFF condition. If prevention level 1 is enabled, the freeze-up prevention will start if the outdoor ambient temperature <4°C and if leaving or return water temperature <7°C. For prevention level 2, the freeze-up prevention will start as soon as the ambient temperature <4°C.

  For both cases the pump will operate and if leaving or return water <5°C for 5 minutes the unit will start up to prevent too low temperatures.

  It is advised to enable freeze-up prevention if the indoor unit is located in a colder ambient room (e.g. garage, ...) to prevent water freeze-up.

[9] Automatic temperature compensation

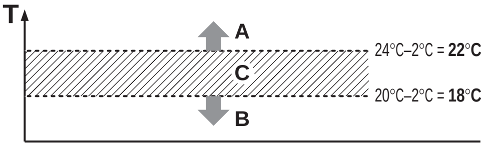
First code	Second code	Setting name	Default value	Range	Step	Unit
9	**Automatic temperature compensation**					
	00	Leaving water temperature compensation value	0	–5~5	0.5	°C
	01	Domestic hot water tank compensation value	0	–5~5	0.5	°C
	02	Thermo ON/OFF admission	0	–5~5	0.5	°C

If needed, it is possible to adjust some thermistor value of the unit by a correction value. This can be used as countermeasure for thermistor tolerances or capacity shortage.

The compensated temperature (= measured temperature plus compensation value) is then used for controlling the system and will be displayed in the temperature read-out mode.

- **[9-00]** Leaving water temperature compensation value
- **[9-01]** Domestic hot water tank compensation value
- **[9-02]** Thermo ON/OFF admission
  By changing this value the operation range for space heating operation can be modified.
  If the ambient temperature becomes higher than (24°C + the value of [9-02]) no space heating is possible.
  Space heating can be requested as long as the ambient temperature is lower than (20°C + the value of [9-02]).

Example: [9-02] = –2°C



A	No space heating operation possible
B	Request for space heating possible
C	Hysteresis area
T	Ambient temperature

[A] Option setup

First code	Second code	Setting name	Default value	Range	Step	Unit
A	**Option setup**					
	00	Current limitation	0	0~2	1	—
	02	Set point: required temperature difference for leaving and returning water	10	5~15	1	°C
	03	Set point: multiple set point 1 required temperature value	35	25~80	1	°C
	04	Set point: multiple set point 2 required temperature value	65	25~80	1	°C

- **[A-01]** Current limitation

Settting	V1	Y1
[A-01]=0 (default)	23 A	13 A
[A-01]=1	18.4 A	10.4 A
[A-02]=2	15 A	8.5 A

The indoor unit current is limited, the outdoor unit is slave and will also reduce its power consumption consequentially. However transient conditions with higher power consumption are possible.

- **[A-02]** Temperature difference for leaving and returning water
  The unit is designed to support radiator operation. The advised leaving water temperature (set by the remote controller) for radiators is 65°C. In such a case the unit will be controlled to realize a temperature difference (ΔT) of 10°C, which means that the returning water to the unit is around 55°C. Depending on the installed application (radiators, fan coil units, ...) or situation, it can be required to change the ΔT. This can be done by changing field setting [A-02].
- **[A-03]** Multi set point 1 temperature.
- **[A-04]** Multi set point 2 temperature.

Notes :

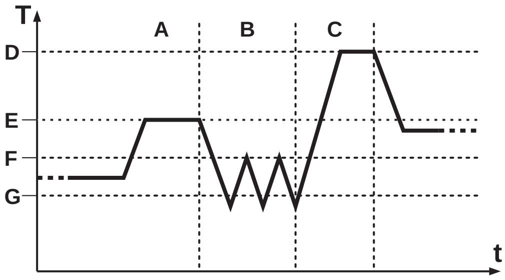
1. When temperature reducing devices are installed, the system can be configured to use multi set points, also the demand PCB (option) is needed.
2. The selected values for multiple set point should be lower than the value from remote controller (reference temperature) or domestic hot water temperature (pattern A).
3. Daikin does not offer any temperature reducing device (TRD). This system (multi set point control) only provides the possibility to use multi set point. It’s than also the installers responsibility to make sure that the whole system is operating well.

[B] Domestic hot water set points

First code	Second code	Setting name	Default value	Range	Step	Unit
B	**Domestic hot water set points**					
	00	Set point: reheat minimum temperature	35	35~65	1	°C
	01	Set point: reheat maximum temperature	45	35~75	1	°C
	02	Status: weather dependent domestic water heating	1 (ON)	0/1	—	—
	03	Set point: storage temperature	70	45~75	1	°C
	04	Automatic maximum domestic hot water storage temperature	70	55~75	1	°C

The reheat mode will prevent the domestic hot water from cooling down lower than a certain temperature. When enabled the indoor unit will deliver hot water to the domestic hot water tank if the reheat minimum value is reached. The domestic water heating will continue until the reheat maximum temperature is reached. In this way always a minimum of domestic hot water is available.

- **[b-00]** Set point: reheat minimum temperature (see figure below).
- **[b-01]** Set point: reheat maximum temperature (see figure below).



A	Storage operation (if activated)
B	Reheat operation (if activated)
C	Disinfection operation (if activated)

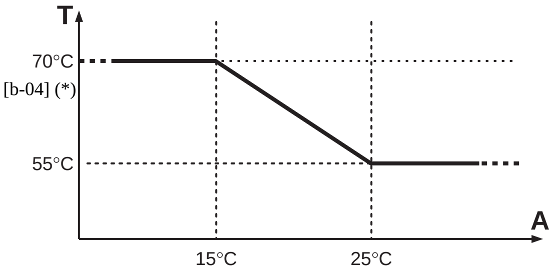
Field settings

D	Disinfection operation temperature [5-00] (e.g. 70°C)
E	Hot water storage temperature [b-03] (e.g. 60°C)
F	Reheat maximum water temperature [b-01] (e.g. 45°C)
G	Reheat minimum water temperature [b-00] (e.g. 35°C)
t	Time
T	Domestic hot water tank temperature

Notes :

1. Remark that the 🚿 icon will only be blinking during effective automatic storage operation. Presence of the permanently lit 🚿 icon does not mean that automatic storage is enabled, but only means that reheat is enabled.
2. During operation it is always possible to cancel the operation by pushing the 🚿 button once.
3. Pushing the ⏻ button has no influence on the domestic water heating. Domestic hot water heating is only switched on or off by means of the 🚿 button and/or disabling the storage schedule timer.

- **[b-02]** Status: defines whether the weather dependent domestic water heating is turned ON (1) or OFF (0).
  If enabled, the storage set point will be set weather dependent.
  In case of a higher ambient temperature (e.g. during summertime), the cold supply water to the mixing tap (e.g. shower, bath) will also have a higher temperature. This makes that the temperature of the hot water from the domestic hot water tank may be lower to reach the same water mixing temperature from the shower or bath mixing tap. In this way, with a lower domestic hot water tank temperature setting the comfort level can be kept the same but with a lower energy consumption.



A	Ambient temperature
T	Domestic hot water storage temperature

(*) For EKHBRD*AA: Fixed at 70°C
For EKHBRD*AB/AC: [b-04]

Note : The temperatures for weather dependent domestic water heating (see figure) are fixed and can not be changed.

- **[b-03]** Set point: storage temperature (see figure above)

Note : If weather dependent domestic water heating is enabled [b-02], the storage temperature will be set automatically and the field setting [b-03] will be of no importance.

- **[b-04]**

For EKHBRD*AA: Not applicable.
For EKHBRD*AB/AC: Automatic maxium domestic hot water storage temperature: default=70°C.

[C] Leaving water temperature limits

First code	Second code	Setting name	Default value	Range	Step	Unit
C	**Leaving water temperature limits**					
	00	Set point: leaving water maximum temperature	80	37~80	1	°C
	01	Set point: leaving water minimum temperature	25	25~37	1	°C

To prevent misuse concerning leaving water temperatures, it is possible to limit the set points.

- **[C-00]** Set point: leaving water maximum temperature
- **[C-01]** Set point: leaving water minimum temperature

[D] Domestic water heating retention times

First code	Second code	Setting name	Default value	Range	Step	Unit
D	**Domestic water heating retention times**					
	00	Set point: minimum time for domestic water heating	10	5~20	1	—
	01	Set point: maximum time for domestic water heating	30	10~60	5	—
	02	Set point: interval minimum stop time of domestic water heating	15	5~30	5	—

The heat pump can only work in either space heating operation or domestic water heating operation. No simultaneous operation is possible, except when using multiple set point control.

- **[d-00]** Set point: minimum operation time for domestic water heating
- **[d-01]** Set point: maximum operation time for domestic water heating
- **[d-02]** Set point: interval minimum stop time of domestic water heating

Changing the timer values can have an impact on space heating and domestic water heating heat up timers. The default values are proposed but can be changed depending on the complete system installation.
For a detailed explanation about simultaneous request of space heating and domestic water heating, see control chapter.

[E] Service mode

First code	Second code	Setting name	Default value	Range	Step	Unit
E	**Service mode**					
	00	Vacuum mode	0	0/1	—	—
	04	Pump only operation	0	0~2	1	—

- **[E-00]** Vacuum mode

  When recovering/vacuuming of the indoor unit is needed, field setting [E-00] should be activated. It will force the unit into thermo OFF and will open the expansion valve of the indoor unit R-134a circuit so full vacuuming is possible.

  By default [E-00] = 0, set to 1 to enable the vacuum mode.

Note : Do not forget to restore the field setting [E-00] to the default value when vacuuming is finished!
When [E-00]=0 is set to 1 (recovery mode), [E-04] can be set to 2 to enhance recovery of the refrigerant.

- **[E-04]** Pump only operation

  When commissioning and installing the unit it is very important to get all air out of the water circuit. Through this field setting the pump can be operated without actual operation of the unit. By doing so this will enhance the air removal from the circuit. The pump can operate at different speed:
  - **[E-04]** = 0 normal operation of the unit (default)
  - **[E-04]** = 1 low pump speed operation (pump only, unit is not operating)
  - **[E-04]** = 2 high pump speed operation (pump only, unit is not operating)

Notes :

1. If you select [E-04]=1 or 2 and [6-00]=1, the unit will activate the domestic hot water 3-way valve. This function is a helpful feature to get all air removed out of the system (as well in space heating as in domestic hot water heating).
   - [E-04]=1 or 2 & [6-00]=0 => Pump operation of 20 minutes. 3-Way valve in space heating mode.
   - [E-04]=1 or 2 & [6-00]=1 => Pump operation of 10 minutes. 3-Way valve in domestic hot water heating mode.
2. Do not forget to restore the field setting [E-04] to the default value when commissioning is finished!
3. When using thermostatic radiator valves, make sure to open all valves during air purging operation.

3.2 Field Setting from Outdoor Unit

Caution

Capacity Setting after changing the main outdoor PC Board (A1P) to spare parts PC Board

When you change the main PC Board (A1P) to spare parts PC Board, please carry out the following setting.

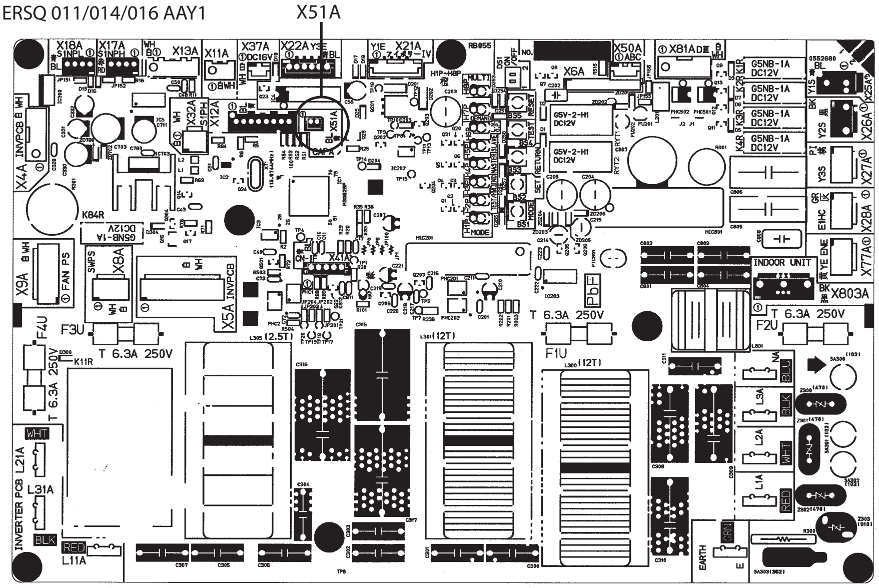
Please Attach the Capacity Setting Adapter corresponding to Capacity Class (ex. 112, 140, 160) in connector X51A. (See Below)

Capacity Setting Adapter

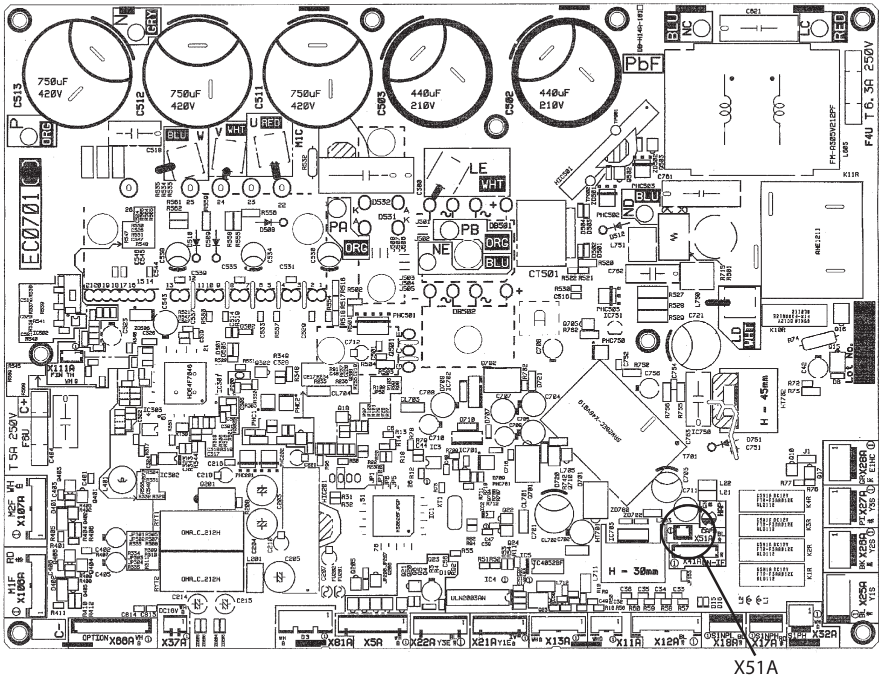
	Capacity Class	Note
①	4 (112)	CAPACITY SETTING ADAPTER (for 11kW/J112)
②	5 (140)	CAPACITY SETTING ADAPTER (for 14kW/J140)
③	6 (160)	CAPACITY SETTING ADAPTER (for 16kW/J160)

Position of Attaching the Capacity Setting Adapter

ERRQ 011/014/016 AAY1
ERSQ 011/014/016 AAY1



ERRQ 011/014/016 AAV1
ERSQ 011/014/016 AAV1



Caution

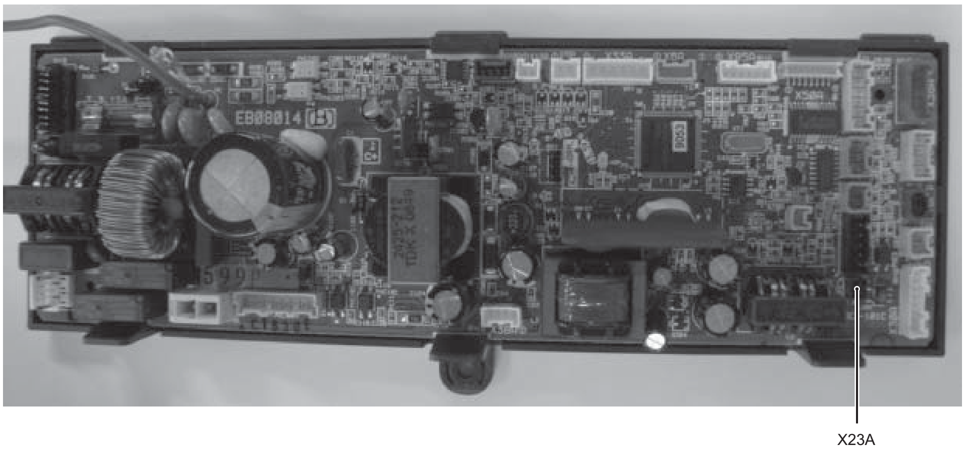
Capacity Setting after changing the main indoor PC Board (A1P) to spare parts PC Board

When you change the main indoor PC Board (A1P) to spare parts PC Board, please carry out the following setting.

Please Attach the Capacity Setting Adapter corresponding to Capacity Class (ex. 112, 140, 160) in connector X23A.
(See Below)

Capacity Setting Adapter

	Capacity Class	Note
①	011 (112)	CAPACITY SETTING ADAPTER (for 011/J112)
②	014 (140)	CAPACITY SETTING ADAPTER (for 014/J140)
③	016 (160)	CAPACITY SETTING ADAPTER (for 016/J160)



■ LED’S DURING initializing: first 12 minutes after power starting

	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H8P
LED indication	●	◐	☼	●	●	●	●	◐

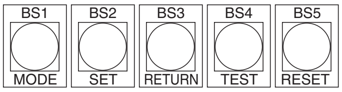
■ Wait until initializing period is over before pressing buttons.

■ Setting by pushbutton switches

The following settings are made by pushbutton switches on PC board.

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
LED indication	●	●	☼	●	●	●	●

(Factory setting = normal operation)



(V2760)

There are the following three setting modes.

① **Setting mode 1 (H1P off)**

Initial status (when normal): Also indicates during “abnormal”.

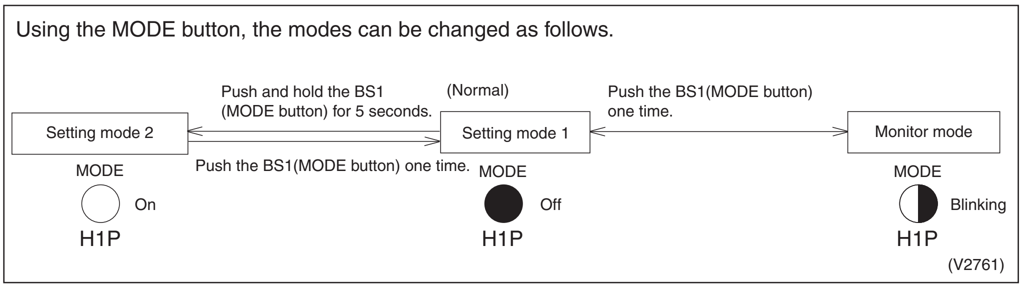
② **Setting mode 2 (H1P on)**

Used to modify the operating status and to set program addresses, etc. Usually used in servicing the system.

③ **Monitor mode (H1P blinks)**

Used to check the program made in Setting mode 2.

■ Mode changing procedure

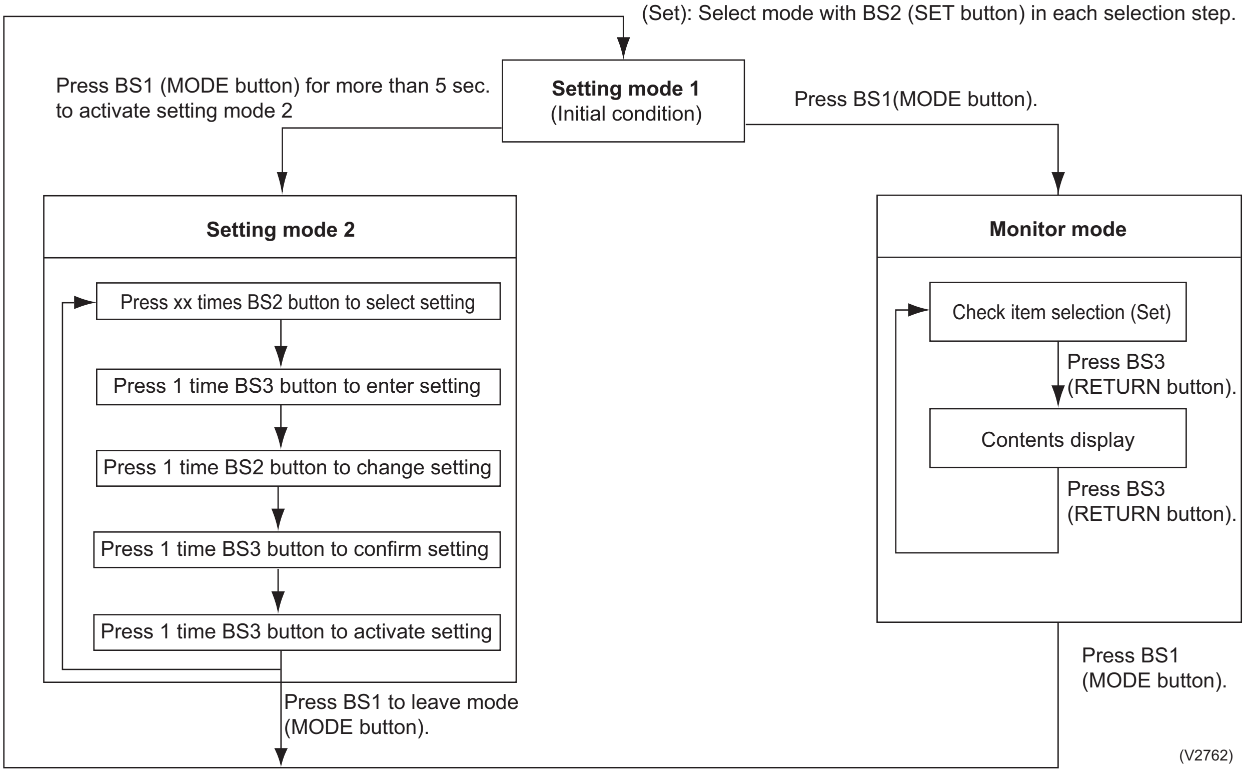


Using the MODE button, the modes can be changed as follows.

Push and hold the BS1 (MODE button) for 5 seconds.
(Normal)
Push the BS1(MODE button) one time.
Setting mode 2
Setting mode 1
Monitor mode
Push the BS1(MODE button) one time.
MODE
On
H1P
MODE
Off
H1P
MODE
Blinking
H1P

(V2761)

■ Mode changing procedure

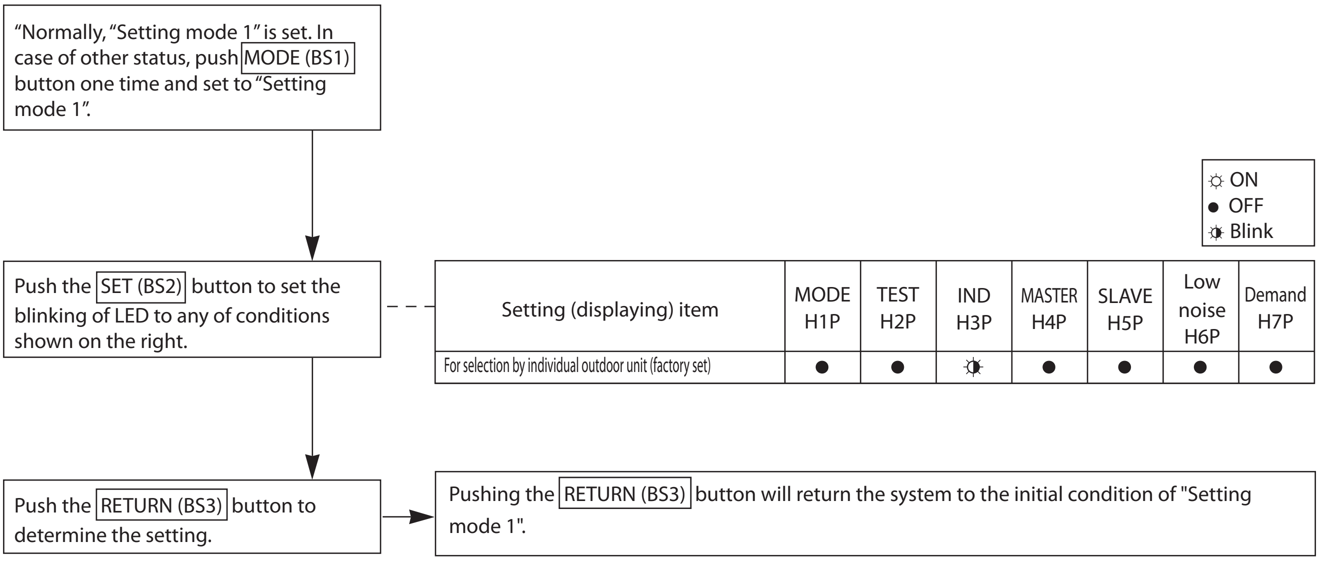

(Set): Select mode with BS2 (SET button) in each selection step.
Setting mode 1
(Initial condition)
Press BS1 (MODE button) for more than 5 sec.
to activate setting mode 2
Press BS1(MODE button).
Setting mode 2
Press xx times BS2 button to select setting
Press 1 time BS3 button to enter setting
Press 1 time BS2 button to change setting
Press 1 time BS3 button to confirm setting
Press 1 time BS3 button to activate setting
Press BS1 to leave mode
(MODE button).
Monitor mode
Check item selection (Set)
Press BS3
(RETURN button).
Contents display
Press BS3
(RETURN button).
Press BS1
(MODE button).
(V2762)

a. “Setting mode 1”

This mode is used to set and check the following items.

1. Set items ················In order to make IND selection in a batch of outdoor unit group, change the setting.
   - IND selection ··· If this setting is changed, U7 error will appear, ONLY FACTORY SETTING IS ALLOWED.
2. Check items ···········The following items can be checked.
   (1) Current operating conditions (Normal / Abnormal / In check operation)
   (2) Setting conditions of COOL/HEAT selection (Individual / Batch master / Batch slave)

Procedure for changing COOL/HEAT selection setting



“Normally, “Setting mode 1” is set. In case of other status, push MODE (BS1) button one time and set to “Setting mode 1”.

Push the SET (BS2) button to set the blinking of LED to any of conditions shown on the right.

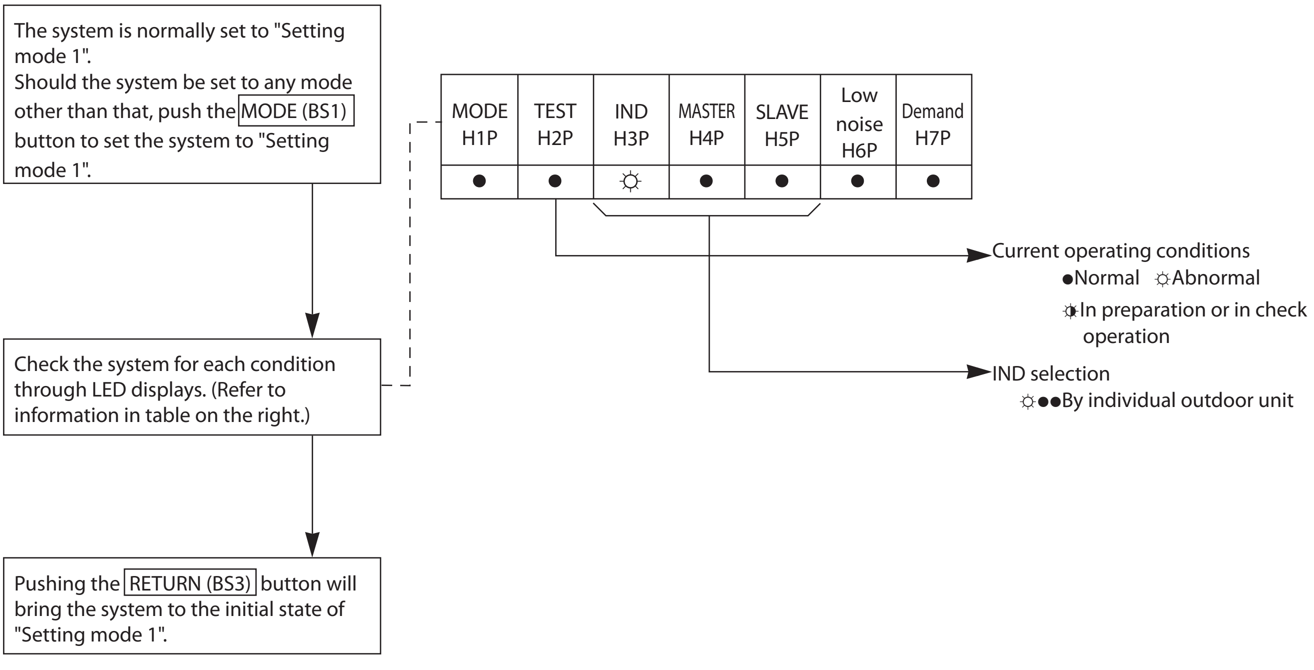
☼ ON
● OFF
✹ Blink

Setting (displaying) item	MODE H1P	TEST H2P	IND H3P	MASTER H4P	SLAVE H5P	Low noise H6P	Demand H7P
For selection by individual outdoor unit (factory set)	●	●	✹	●	●	●	●

Push the RETURN (BS3) button to determine the setting.

Pushing the RETURN (BS3) button will return the system to the initial condition of "Setting mode 1".

Procedure for checking check items



The system is normally set to "Setting mode 1". Should the system be set to any mode other than that, push the MODE (BS1) button to set the system to "Setting mode 1".

MODE H1P	TEST H2P	IND H3P	MASTER H4P	SLAVE H5P	Low noise H6P	Demand H7P
●	●	☼	●	●	●	●

Current operating conditions
●Normal ☼Abnormal
✹In preparation or in check operation

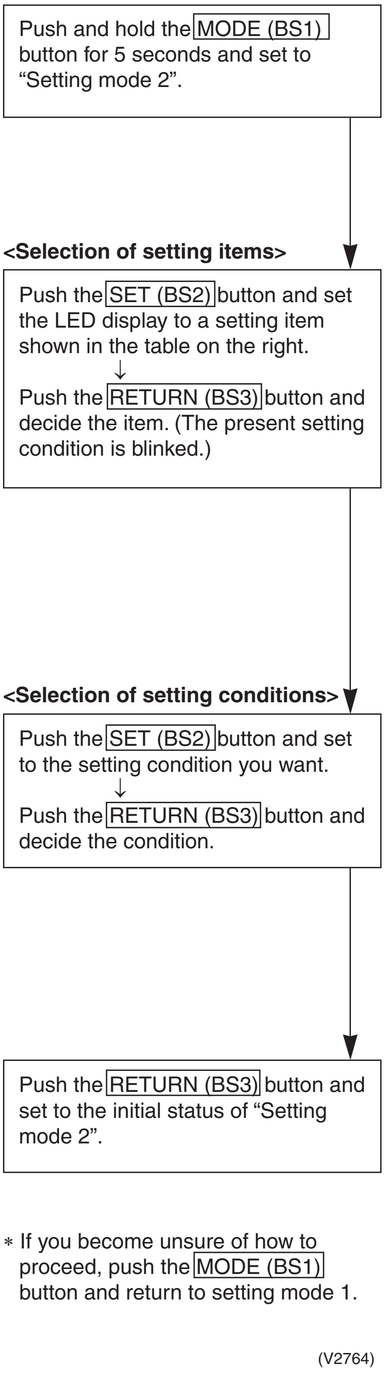
IND selection
☼●●By individual outdoor unit

Check the system for each condition through LED displays. (Refer to information in table on the right.)

Pushing the RETURN (BS3) button will bring the system to the initial state of "Setting mode 1".

(V2763)

b. “Setting mode 2”



Push and hold the MODE (BS1) button for 5 seconds and set to “Setting mode 2”.

<Selection of setting items>

Push the SET (BS2) button and set the LED display to a setting item shown in the table on the right.

↓

Push the RETURN (BS3) button and decide the item. (The present setting condition is blinked.)

<Selection of setting conditions>

Push the SET (BS2) button and set to the setting condition you want.

↓

Push the RETURN (BS3) button and decide the condition.

Push the RETURN (BS3) button and set to the initial status of “Setting mode 2”.

∗ If you become unsure of how to proceed, push the MODE (BS1) button and return to setting mode 1.

(V2764)

No.	Setting item	Description
21	Refrigerant recovery / vacuuming mode setting of R-410A circuit	Sets to refrigerant recovery or vacuuming mode.
61	Automatic pump down operation	An automatic pump down operation which will collect all refrigerant from the field piping and indoor unit in the outdoor unit.

The numbers in the "No." column represent the number of times to press the SET (BS2) button.

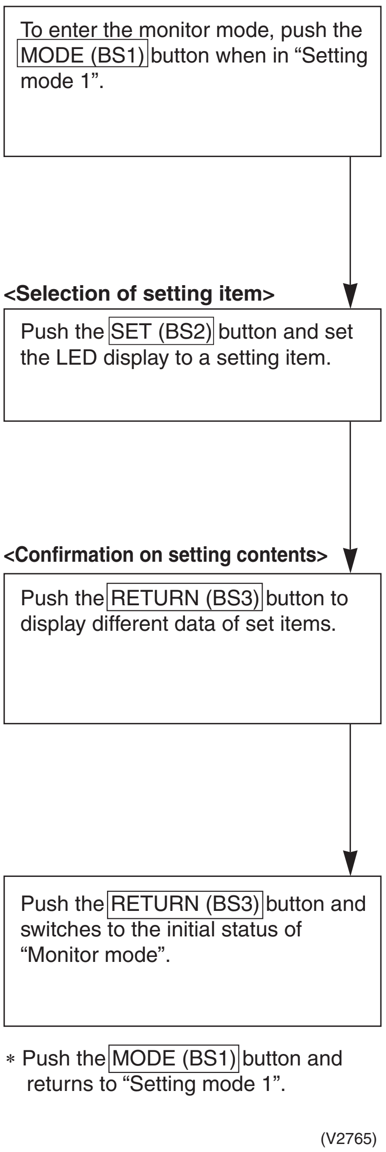
Remark: Pump down operation is **ONLY ALLOWED** when the refrigerant charge is less than ≤ 4,5kg.

No.	Setting item display								Setting condition display	✻ Factory set
	Setting item	MODE H1P	TEST H2P	C/H selection			Low noise H6P	Demand H7P		
				IND H3P	Master H4P	Slave H5P				
21	Refrigerant recovery / vacuuming mode setting of R-410A circuit	☼	●	☼	●	☼	●	☼	Refrigerant recovery / vacuuming: OFF	☼●●●●●☼ ✻
									Refrigerant recovery / vacuuming: ON	☼●●●●☼●
61	Automatic pump down operation	☼	☼	☼	☼	☼	●	☼	Pump down: OFF	☼●●●●●☼ ✻
									Pump down: ON	☼●●●●☼●

The numbers in the "No." column represent the number of times to press the SET (BS2) button.

Note : 8HP not important to change settings.

c. Monitor mode



To enter the monitor mode, push the MODE (BS1) button when in “Setting mode 1”.

<Selection of setting item>

Push the SET (BS2) button and set the LED display to a setting item.

<Confirmation on setting contents>

Push the RETURN (BS3) button to display different data of set items.

Push the RETURN (BS3) button and switches to the initial status of “Monitor mode”.

∗ Push the MODE (BS1) button and returns to “Setting mode 1”.

(V2765)

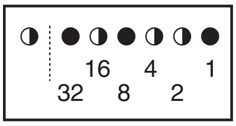
No.	Setting item	LED display							Data display
		H1P	H2P	H3P	H4P	H5P	H6P	H7P	
14	Contents of malfunction (the latest)	☼	●	●	☼	☼	☼	●	Malfunction code table Refer to page 138.
15	Contents of malfunction (1 cycle before)	☼	●	●	☼	☼	☼	☼	
16	Contents of malfunction (2 cycle before)	☼	●	☼	●	●	●	●	
20	Contents of retry (the latest)	☼	●	☼	●	☼	●	●	
21	Contents of retry (1 cycle before)	☼	●	☼	●	☼	●	☼	
22	Contents of retry (2 cycle before)	☼	●	☼	●	☼	☼	●	
25	Normal judgment of outdoor units PC board	◐	●	☼	☼	●	●	☼	Lower 2 digits: ☼● Abnormal ●☼ Normal ●● Unjudgment

The numbers in the "No." column represent the number of times to press the SET (BS2) button.

Note : 8HP not important to change settings.

Push the SET button and match with the LEDs No. 1 - 15, push the RETURN button, and confirm the data for each setting.

★ Data such as addresses and number of units is expressed as binary numbers; the two ways of expressing are as follows:



The No. 1 cool/heat unified address is expressed as a binary number consisting of the lower 6 digits. (0 - 63)

In ① the address is 010110 (binary number), which translates to 16 + 4 + 2 = 22 (base 10 number). In other words, the address is 22.

3.2.1 Setting of Refrigerant Recovery Mode

When carrying out the refrigerant collection on site, fully open the respective expansion valve of indoor and outdoor units
All indoor and outdoor unit’s operation are prohibited.

[Operation procedure]

① In “Setting Mode 2” with units in stop mode, set “B Refrigerant Recovery / Vacuuming mode” (setting 21) to ON. The respective expansion valve of indoor and outdoor units are fully opened. “TEST OPERATION” and “UNDER CENTRALIZED CONTROL” are displayed on the remote control, and the indoor / outdoor unit operation is prohibited.
After setting, do not cancel “Setting Mode 2” until completion of refrigerant recovery operation.

② Collect the refrigerant using a refrigerant recovery unit. (See the operation manual attached to the refrigerant recovery unit for more detail.)

③ When finished collecting refrigerant, press Mode button “BS1” once and reset “Setting Mode 2”.

3.2.2 Setting of Vacuuming Mode

In order to perform vacuuming operation at site, fully open the expansion valves of indoor and outdoor units and turn on some solenoid valves.

[Operating procedure]

① In "Setting Mode 2" with units in stop mode, set "B Refrigerant Recovery / Vacuuming mode" (setting 21) to ON. The respective expansion valve of indoor and outdoor units are fully opened. "TEST OPERATION" and "UNDER CENTRALIZED CONTROL" are displayed on the remote control, and the indoor / outdoor unit operation is prohibited.
After setting, do not cancel "Setting Mode 2" until completion of Vacuuming operation.

② Use the vacuum pump to perform vacuuming operation.

③ When finished vacuuming, press Mode button "BS1" once and reset "Setting Mode 2".

3.2.3 Setting of Automatic Pump Down Operation

When carrying out the automatic pump down operation, follow below operation procedure.

[Operating procedure]

① Turn on the main power supply.

② Make sure the liquid stop valve is closed and the gas stop valve is open and that the low pressure switch is working.

③ In "Setting Mode 2", set "Automatic Pump Down" (setting 61) to ON. After setting, do not cancel "Setting Mode 2" until completion of pump down operation.

④ The compressor and outdoor unit fan will start operating automatically. During operation, the LED's are showing the progress.

(☼: ON ●: OFF ☀: BLINK)

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
Step 1	☼	☀	☼	☼	☼	☼	☼
Step 2	☼	☀	●	☼	☼	☼	☼
Step 3	☼	☀	●	●	☼	☼	☼
Step 4	☼	☀	●	●	●	☼	☼
Step 5	☼	☀	●	●	●	●	☼
Step 6	☼	☀	●	●	●	●	☀

⑤ If step 6 is reached (pressure drops below 3 bar) or if operation stops, close the gas stop valve.

⑥ Turn off the main power supply.

Remark: Make sure to re-open both stop valves before restarting the unit.

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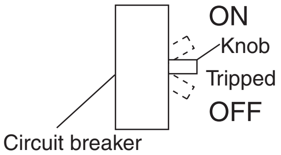
1. Symptom-based Troubleshooting

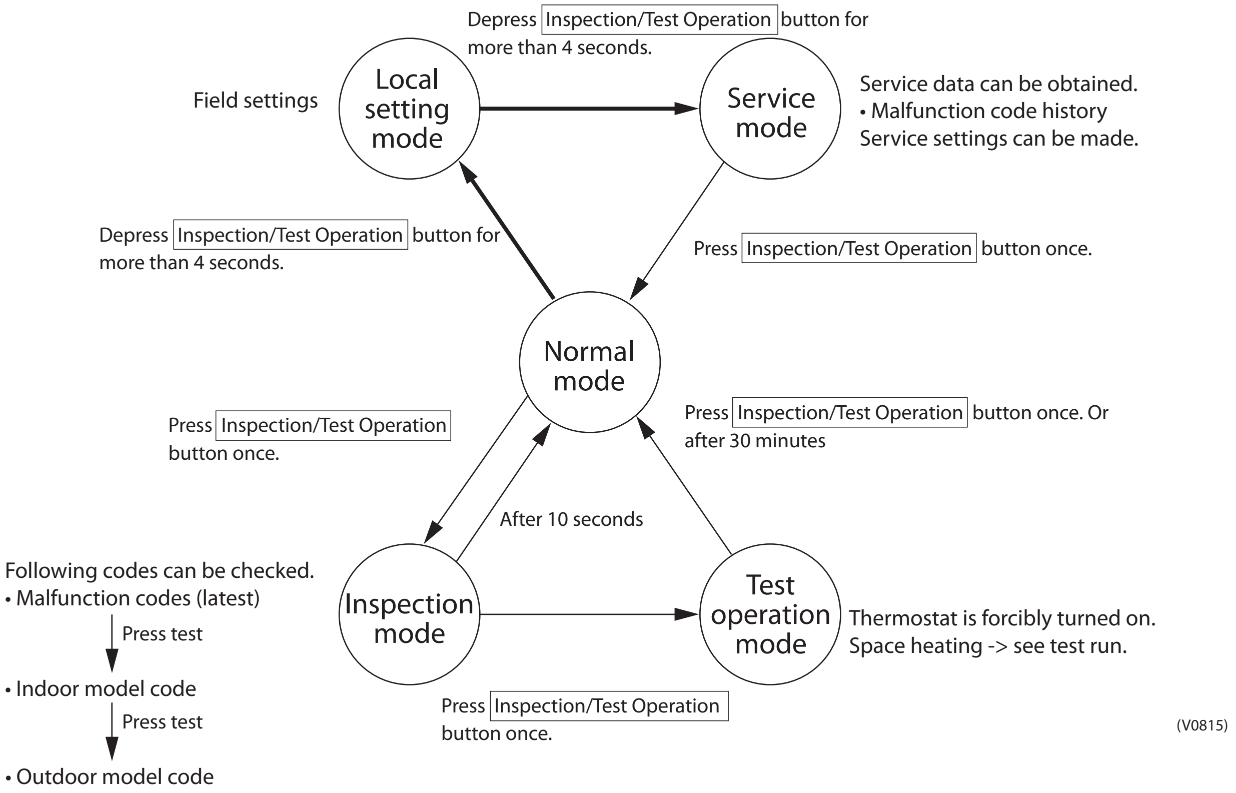
	Symptom		Supposed Cause	Countermeasure
1	The system does not start operation at all.		Blowout of fuse(s)	Turn Off the power supply and then replace the fuse(s).
			Cutout of breaker(s)	• If the knob of any breaker is in its OFF position, turn ON the power supply. • If the knob of any circuit breaker is in its tripped position, do not turn ON the power supply. 
			Power failure	After the power failure is reset, restart the system.
			Open phase in power supply cable	Check power supply. After that, properly connect the power supply cable, and then turn ON the power supply.
2	The system starts operation but makes an immediate stop.		Blocked air inlet or outlet of outdoor unit	Remove obstacle(s).
3	The unit is turned on but the unit is not heating as expected.		The temperature setting is not correct.	Check the controller set point + settings (room + water).
			Capacity shortage.	Check if the cooling fans at the rear of the switch box are working properly.
			The water volume in the installation is too low.	Make sure that the water volume in the installation is above the minimum required value.
				Check if there is no bypass of the water circuit.
			The water flow is too low.	• Check that all shut-off valves of the water circuit are completely open. • Check if the water filter needs cleaning. • Make sure there is no air in the system (purge air). • Make sure that the expansion vessel is not broken. • Check the water pressure on the manometer > 0,3 bar.
4	The system does not operate.	The system stops and immediately restarts operation.	If the OPERATION lamp on the remote control turns ON, the system will be normal. These symptoms indicate that the system is controlled so as not to put unreasonable loads on the system.	Normal operation. The system will automatically start operation after a lapse of five minutes.
		The remote control displays "UNDER CENTRALIZED CONTROL", which blinks for a period of several seconds when the OPERATION button is depressed.	The system is controlled with centralized control.	Recovery/vacuum mode is active (higher priority mode).
		The system stops immediately after turning ON the power supply.	The system is in preparation mode of micro computer operation.	Wait for a period of approximately one minute.
5	The system makes intermittent stops.	The remote control displays malfunction codes "U4" and "U5", and the system stops but restarts after a lapse of several minutes.	The system stops due to an interruption in communication between units caused by electrical noises coming from equipment other than air conditioners.	Remove causes of electrical noises. If these causes are removed, the system will automatically restart operation.

	Symptom		Supposed Cause	Countermeasure
6	The system produces sounds.	<Indoor unit> Immediately after turning ON the power supply, indoor unit produces "ringing" sounds.	These are operating sounds of the electronic expansion valve of the indoor unit.	Normal operation. This sound becomes low after a lapse of approximately one minute.
		<Indoor and outdoor units> "Hissing" sounds are continuously produced while in cooling or defrosting operation.	These sounds are produced from gas (refrigerant) flowing respectively through the indoor and outdoor units.	Normal operation.
		<Indoor and outdoor units> "Hissing" sounds are produced immediately after the startup or stop of the system, or the startup or stop of defrosting operation.	These sounds are produced when the gas (refrigerant) stops or changes flowing.	Normal operation.
		<Indoor unit> "Creaking" sounds are produced while in heating operation or after stopping the operation.	These sounds are produced from resin parts expanding and contracting with temperature changes.	Normal operation.
		<Outdoor unit> Pitch of operating sounds changes.	The reason is that the compressor changes the operating frequency.	Normal operation.
		The pump is making noise (cavitation).	There is air in the system.	Purge air.
			Water pressure at pump inlet is too low.	• Check on the manometer that is sufficient water pressure. The water pressure must be > 0,3 bar. • Check that the manometer is not broken. • Check that the expansion vessel is not broken. • Check if the pressure of the expansion vessel is correct.
7	Outdoor unit fan does not rotate.	In operation	The reason is that fan revolutions are controlled to put the operation to the optimum state.	Normal operation.
8	LCD display "88" appears on the remote control.	Immediately after turning ON the power supply	The reason is that the system is checking to be sure the remote control is normal.	Normal operation. This code is displayed for a period of approximately one minute at maximum.
9	The outdoor gets hot.	While stopping operation	The reason is that the compressor is warmed up to provide smooth startup of the system.	Normal operation.
10	The water pressure relief valve leaks.		The expansion vessel is broken.	Replace the expansion vessel.
			The water volume in the installation is too high.	Make sure that the water volume in the installation is under the maximum allowed value.
			Dirt is blocking the water pressure relief valve.	Check for correct operation of the pressure relief valve by turning the red knob on the valve counter clockwise: • You should hear a clocking sound. • In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then replace the relief valve.
11	Malfunction of the schedule timer.		The schedule timer does not work but the programmed actions are executed at the wrong time.	Check if the clock and the day of the week are set correctly, correct if necessary.

2. Troubleshooting by Remote Control

2.1 The INSPECTION / TEST Button

The following modes can be selected by using the [Inspection/Test Operation] button on the remote control.

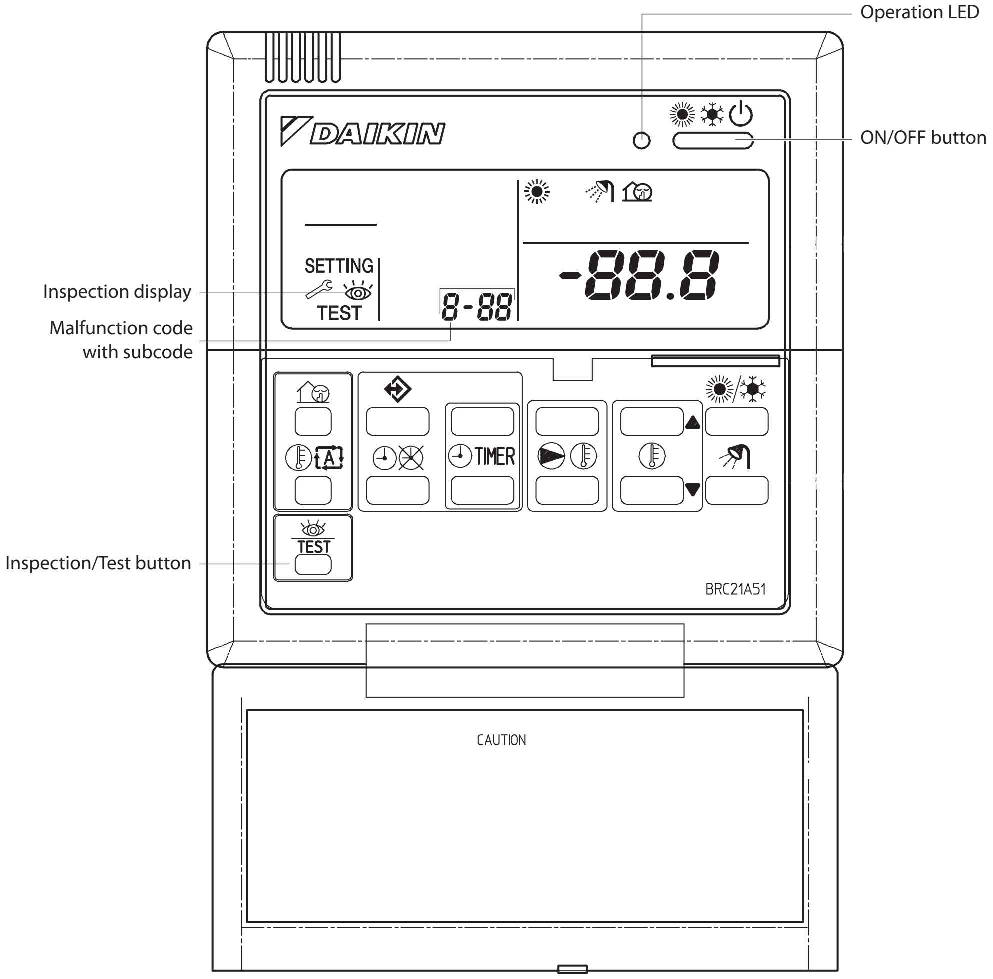

Depress Inspection/Test Operation button for more than 4 seconds.
Field settings
Local setting mode
Service mode
Service data can be obtained.
• Malfunction code history
Service settings can be made.
Depress Inspection/Test Operation button for more than 4 seconds.
Press Inspection/Test Operation button once.
Normal mode
Press Inspection/Test Operation button once.
Press Inspection/Test Operation button once. Or after 30 minutes
After 10 seconds
Following codes can be checked.
• Malfunction codes (latest)
Press test
• Indoor model code
Press test
• Outdoor model code
Inspection mode
Test operation mode
Thermostat is forcibly turned on.
Space heating -> see test run.
Press Inspection/Test Operation button once.
(V0815)

See "Operation of the Remote Controller's Inspection / Test Operation Button".

2.2 Self-diagnosis by Wired Remote Control

Explanation

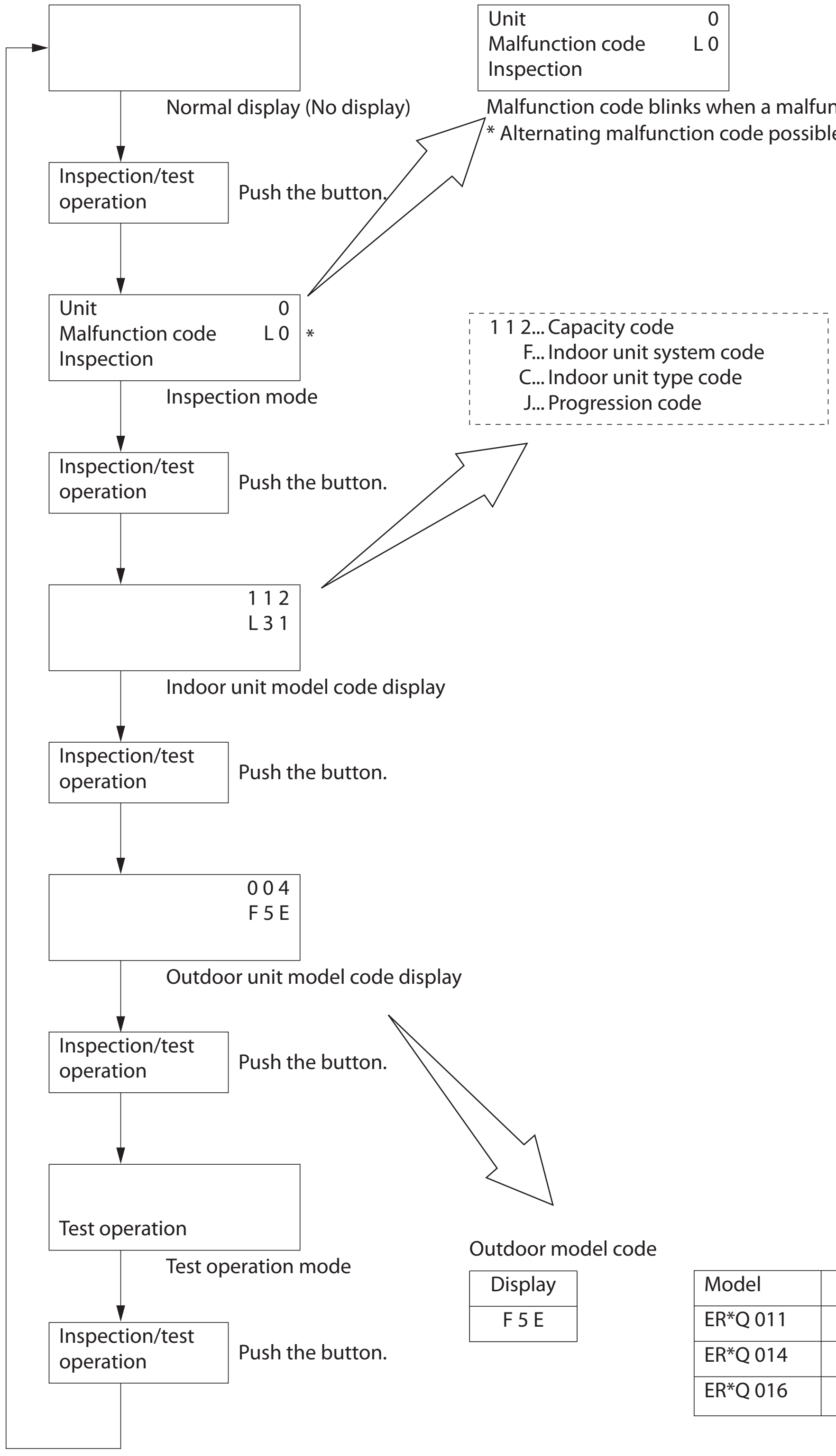
If operation stops due to malfunction, the remote control's operation LED blinks, and malfunction code is displayed. (Even if stop operation is carried out, malfunction contents are displayed when the inspection mode is entered.) The malfunction code enables you to tell what kind of malfunction caused operation to stop. See page 137 for malfunction code and malfunction contents.



Note:

1. Pressing the INSPECTION/TEST button will blink the check indication.
2. While in check mode, pressing and holding the ON/OFF button for a period of five seconds or more will clear the failure history indication shown above. In this case, on the codes display, the malfunction code will blink twice and then change to "00" (=Normal), the Unit No. will change to "0", and the operation mode will automatically switch from check mode to normal mode (displaying the set temperature).
3. Subcode is needed to indicate which refrigerant system is causing the error.

2.3 Operation of the Remote Controller’s Inspection / Test Operation Button


Normal display (No display)
Unit 0
Malfunction code L 0
Inspection
Malfunction code blinks when a malfunction occurs.
* Alternating malfunction code possible: indication for refrigerant type (IU/OU)
Inspection/test operation
Push the button.
Unit 0
Malfunction code L 0 *
Inspection
Inspection mode
1 1 2... Capacity code
F... Indoor unit system code
C... Indoor unit type code
J... Progression code
Inspection/test operation
Push the button.
1 1 2
L 3 1
Indoor unit model code display
Inspection/test operation
Push the button.
0 0 4
F 5 E
Outdoor unit model code display
Inspection/test operation
Push the button.
Test operation
Test operation mode
Inspection/test operation
Push the button.

Example of capacity code display

Example model	Display
EKHBRD 011	112
EKHBRD 014	140
EKHBRD 016	160

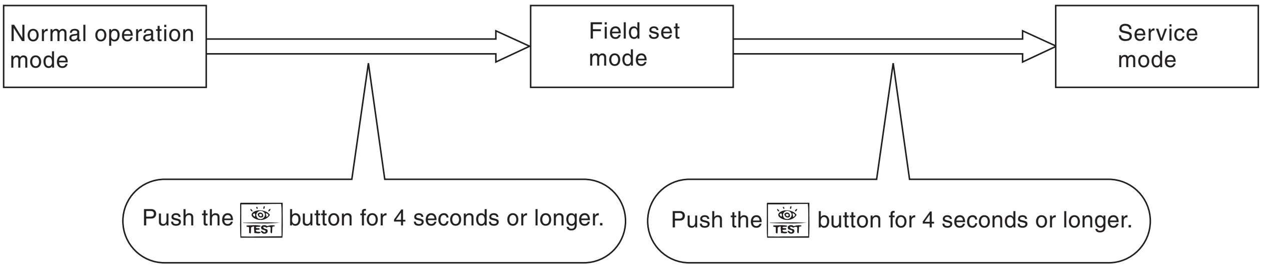
Outdoor model code

Display
F 5 E

Model	Display
ER*Q 011	004
ER*Q 014	005
ER*Q 016	006

2.4 Remote Control Service Mode

How to Enter the Service Mode

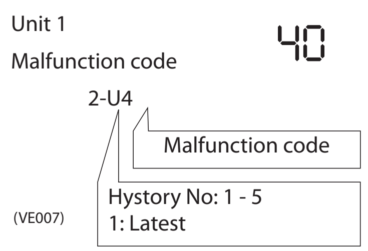

Normal operation mode
Field set mode
Service mode
Push the TEST button for 4 seconds or longer.
Push the TEST button for 4 seconds or longer.

(VF020)

Service Mode Operation Method

1. **Select the mode No.**

Only Mode 40 can be set.

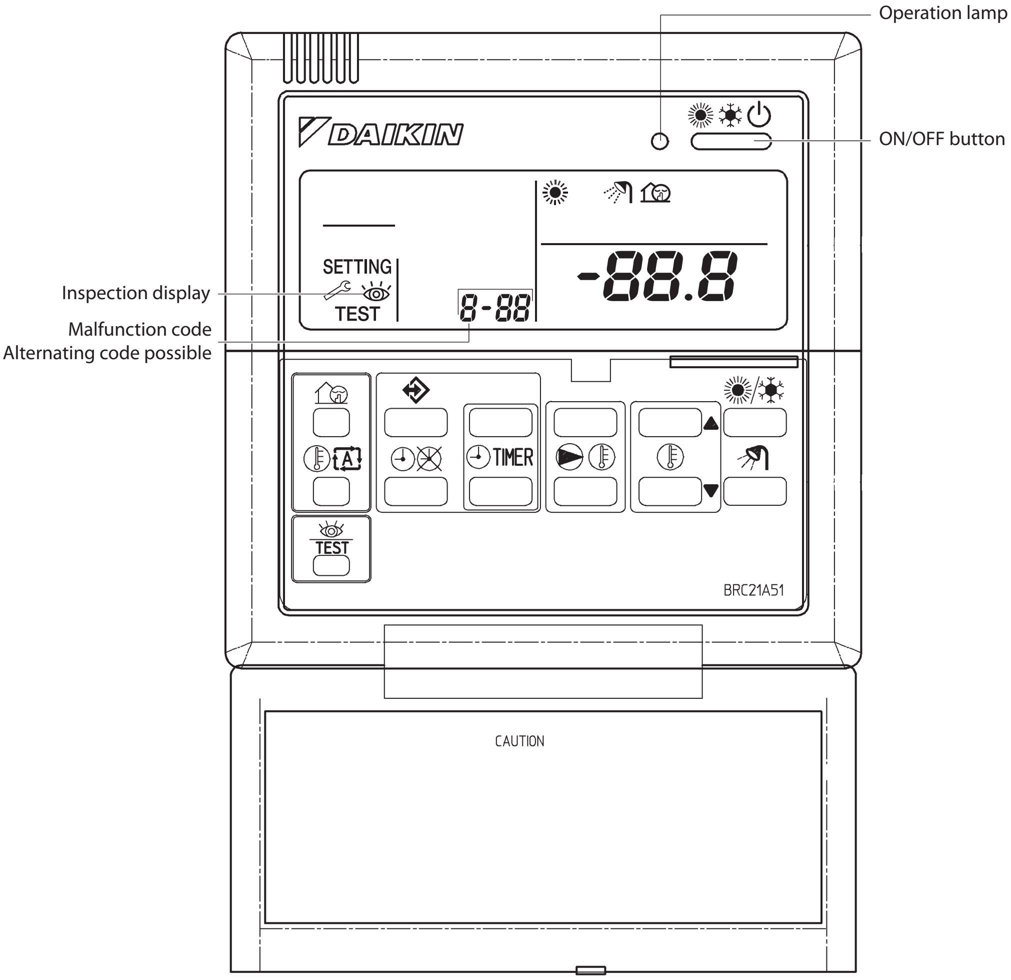
Mode No	Function	Contents and operation method	Remote control display example
40	Malfunction hysteresis display	Display malfunction hysteresis.	 Unit 1 40 Malfunction code 2-U4 Malfunction code Hystory No: 1 - 5 1: Latest (VE007)
		The history No. can be changed with the ▲▼ button.	

Remark: The malfunction code can give also an extra subcode (alternating). With this subcode we can distinguish if the error is related to the R-410A or R-134a circuit.

2.5 Remote Controller Self-Diagnosis Function

The remote controller switches are equipped with a self diagnosis function so that more appropriate maintenance can be carried out. If a malfunction occurs during operation, the operation lamp, malfunction code and display of malfunctioning unit No. let you know the contents and location of the malfunction.

When there is a stop due to malfunction, the contents of the malfunction given below can be diagnosed by a combination of operation lamp, INSPECTION display of the liquid crystal display and display of malfunction code. It also lets you know the unit No. during group control.

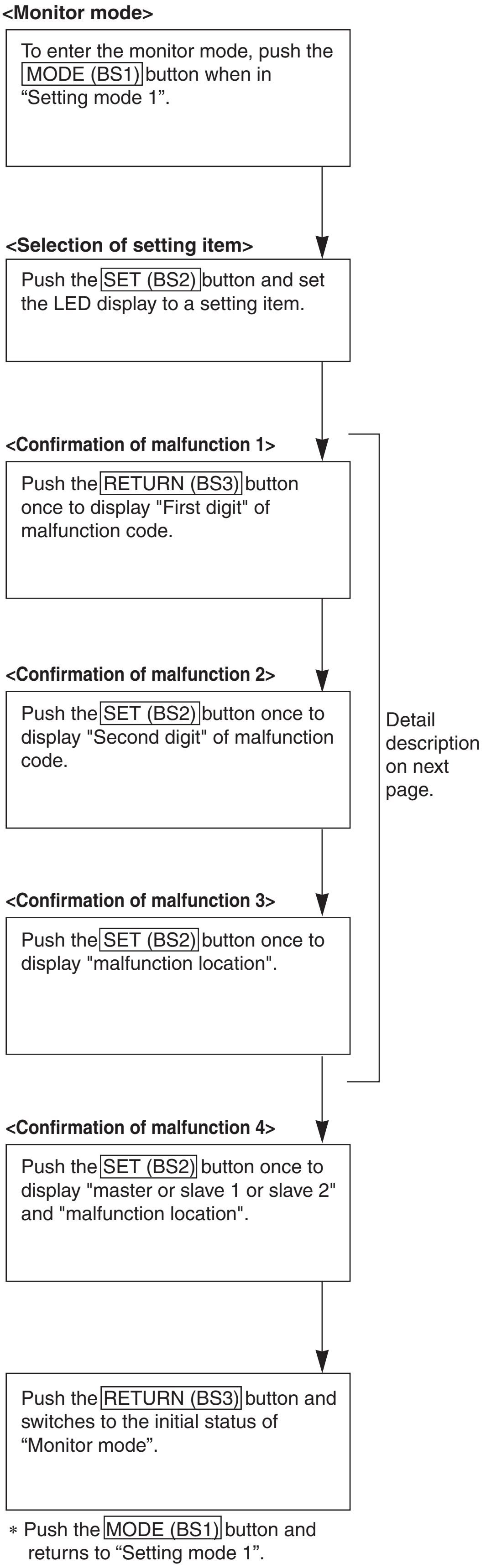


☼: ON ●: OFF ☀: Blink

	Malfunction code	Operation lamp	Malfunction contents	Page Referred
	A1	☀	PC board defect, E^2 PROM defect	142
	A6	☀	Pump error	143
	A9	☀	Malfunction of moving part of electronic expansion valve (Y1E)	144
	AJ	☀	Malfunction of capacity setting	147
	C1	☀	Failure of transmission (between indoor unit PC board and fan PC board)	148
	C4	☀	Malfunction of thermistor (R3T) for R-410A liquid/indoor unit (loose connection, disconnection, short circuit, failure)	150
	C5	☀	Malfunction of thermistor (R2T) for tank thermistor (loose connection, disconnection, short circuit, failure)	151
	C9	☀	Malfunction of thermistor (R4T) for return water thermistor (loose connection, disconnection, short circuit, failure)	152
	CA	☀	Malfunction of thermistor (R5T) for leaving water temperature (loose connection, disconnection, short circuit, failure)	153
	CJ	☼	Malfunction of thermostat sensor in remote control	154
	E1	☀	PC board defect	155
	E3	☀	Actuation of high pressure switch	157
	E4	☀	Actuation of low pressure sensor	162
	E5	☀	Compressor motor lock	166
	E6	☀	Standard compressor lock or over current	—
	E7	☀	Malfunction of outdoor unit fan motor	168
	E9	☀	Malfunction of moving part of electronic expansion valve (Y1E, Y3E)	170
	F3	☀	Abnormal discharge pipe temperature	174
	H9	☀	Malfunction of thermistor (R1T) for outdoor air (loose connection, disconnection, short circuit, failure)	176
	J2	☀	Current sensor malfunction	—
	J3	☀	Malfunction of discharge pipe thermistor (R2T, R6T) (loose connection, disconnection, short circuit, failure)	177
	J5	☀	Malfunction of thermistor (R3T, R5T, R7T) for suction pipe (loose connection, disconnection, short circuit, failure)	179
	J6	☀	Malfunction of thermistor (R6T triphase R4T mono)	181
	J7	☀	Malfunction of thermistor (R7T) for outdoor unit liquid pipe	182
	J9	☀	Malfunction of subcooling heat exchanger gas pipe thermistor (R4T)	183
	JA	☀	Malfunction of high pressure sensor IU/OU	184
	JC	☀	Malfunction of low pressure sensor IU/OU	186
	L1	☀	Malfunction of PC board	188
	L4	☀	Malfunction of inverter radiating fin temperature rise	190
	L5	☀	Inverter compressor abnormal	192
	L8	☀	Inverter current abnormal	194
	L9	☀	Inverter start up error	196
	LC	☀	Malfunction of transmission between inverter and control PC board	198
	P1	☀	High voltage of capacitor in main inverter circuit.	201
	PJ	☀	Faulty combination of PCB	203
System	U0	☼	Low pressure drop due to refrigerant shortage or electronic expansion valve failure	204
	U2	☀	Power supply insufficient or instantaneous failure	206
	U4	☀	Malfunction of transmission between indoor and outdoor unit	210
	U5	☀	Malfunction of transmission between remote control and indoor unit	213
	U5	●	Failure of remote control PC board or setting during control by remote control	213
	U7	☀	Malfunction of transmission outdoor unit	214
	U8	☀	Malfunction of transmission between main and sub remote controls (malfunction of sub remote control)	215
	UA	☀	Communication error between outdoor unit and indoor unit	216
	UF	☀	System is not set yet	204
	UH	☀	Malfunction of system, refrigerant system address undefined	205

▨ The system operates for malfunction codes indicated in black squares, however, be sure to check and repair.

Malfunction code indication by outdoor unit PC board



<Monitor mode>

To enter the monitor mode, push the MODE (BS1) button when in "Setting mode 1".

<Selection of setting item>

Push the SET (BS2) button and set the LED display to a setting item.

<Confirmation of malfunction 1>

Push the RETURN (BS3) button once to display "First digit" of malfunction code.

<Confirmation of malfunction 2>

Push the SET (BS2) button once to display "Second digit" of malfunction code.

<Confirmation of malfunction 3>

Push the SET (BS2) button once to display "malfunction location".

<Confirmation of malfunction 4>

Push the SET (BS2) button once to display "master or slave 1 or slave 2" and "malfunction location".

Push the RETURN (BS3) button and switches to the initial status of "Monitor mode".

∗ Push the MODE (BS1) button and returns to "Setting mode 1".

Contents of malfunction		Malfunction code
In-phase malfunction of DIII Net	Detection of DIII Net	E1
Abnormal discharge pressure	HPS activated	E3
Abnormal suction pressure	Abnormal Pe	E4
Compressor lock	Detection of INV compressor lock	E5
Over load, over current, abnormal lock of outdoor unit fan motor	Detection of DC fan 1 motor lock	E7
	Detection of DC fan 2 motor lock	
Malfunction of electronic expansion valve	EV1	E9
	EV3	
Faulty sensor of outdoor air temperature	Faulty Ta sensor (short)	H9
Abnormal discharge pipe temperature	Abnormal Td	F3
Abnormal heat exchanger temperature	Refrigerant over charge	F6
Faulty sensor of discharge pipe temperature	Faulty Tdi sensor (short)	J3
Faulty sensor of suction pipe temperature	Faulty Ts1 sensor (short)	J5
	Faulty Ts2 sensor (short)	
Faulty sensor of heat exchanger temperature	Faulty Tb sensor (short)	J6
Malfunction of the liquid pipe temperature sensor	Faulty TI sensor (short)	J7
Faulty sensor of subcool heat exchanger temperature	Faulty Tsh sensor (short)	J9
Faulty sensor of discharge pressure	Faulty Pc sensor (short)	JA
Faulty sensor of suction pressure	Faulty Pe sensor (short)	JC
Faulty Inverter PC board	Faulty IPM	L1
	Abnormal Current sensor offset	
	Abnormal IGBT	
	Faulty Current sensor	
	Abnormal SP-PAM over-voltage	
Inverter radiation fin temperature rising	Over heating of inverter radiation fin temperature	L4
DC output over current	Inverter instantaneous over current	L5
Electronic thermal	Electronic thermal switch 1	L8
	Electronic thermal switch 2	
	Out-of-step	
	Speed down after startup	
	Lightening detection	
Stall prevention (Limit time)	Stall prevention (Current increasing)	L9
	Stall prevention (Faulty start up)	
	Abnormal wave form in startup	
	Out-of-step	
Transmission error between inverter and outdoor unit	Inverter transmission error	LC

☼: ON ●: OFF ☀:Blink

Malfunction code	Confirmation of malfunction 1							Confirmation of malfunction 2							Confirmation of malfunction 3							Confirmation of malfunction 4						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P
E1	☀			●	●	☀	☀	☀			●	●	●	☀	☀	☼	●	●	●	●	●	☀	☼	☼	●	●	☀	☀
E3								☀			●	●	☀	☀	☀			●	●	●	●	☀			●	●	*1	
E4								☀			●	☀	●	●	☀			●	●	●	●	☀			●	●		
E5								☀			●	☀	●	☀	☀			●	●	●	●	☀			●	●		
E7								☀			●	☀	☀	☀	☀			●	●	●	●	☀			●	☀		
															☀			●	●	●	☀	☀			●	☀		
E9								☀			☀	●	●	☀	☀			●	●	●	●	☀			●	●		
															☀			●	●	●	●	☀			☀	●		
H9								☀			☀	●	●	☀	☀			●	●	●	●	☀			●	●	*1	
F3	☀			●	☀	●	☀	☀			●	●	☀	☀	☀			●	●	●	●	☀			●	●	*1	
F6								☀			●	☀	☀	●	☀			●	●	●	●	☀			●	●	☀	☀
J3	☀			●	☀	☀	●	☀			●	●	☀	☀	☀			●	●	●	●	☀			●	●	*1	
J5								☀			●	☀	●	☀	☀			●	●	●	●	☀			●	●		
															☀			●	●	●	●	☀			●	☀		
J6								☀			●	☀	☀	●	☀			●	●	●	●	☀			●	●		
J7								☀			●	☀	☀	☀	☀			●	●	●	●	☀			●	●		
J9								☀			☀	●	●	☀	☀			●	●	●	●	☀			●	●		
JA								☀			☀	●	☀	●	☀			●	●	●	●	☀			●	●		
JC								☀			☀	☀	●	●	☀			●	●	●	●	☀			●	●		
L1	☀			●	☀	☀	☀	☀			●	●	●	☀	☀			●	●	●	●	☀			●	●	●	●
								☀			●	●	●	☀	☀			●	●	●	●	☀			●	●	●	☀
								☀			●	●	●	☀	☀			●	●	●	●	☀			●	●	☀	●
								☀			●	●	●	☀	☀			●	●	●	●	☀			●	●	☀	☀
								☀			●	●	●	☀	☀			●	●	●	●	☀			●	☀	●	●
L4								☀			●	☀	●	●	☀			●	●	●	●	☀			●	●	*1	
L5								☀			●	☀	●	☀	☀			●	●	●	●	☀			●	●		
L8								☀			☀	●	●	●	☀			●	●	●	●	☀			●	●		
															☀			●	●	●	●	☀			●	☀		
																		●	●	●	●							
															☀			●	●	●	●	☀			☀	●		
															☀			●	●	●	☀	☀			●	●		
L9								☀			☀	●	●	☀	☀			●	●	●	●	☀			●	●		
															☀			●	●	●	●	☀			●	☀		
															☀			●	●	●	●	☀			☀	●		
LC								☀			☀	☀	●	●	☀			●	●	●	●	☀			●	☀		

Display of contents of malfunction (first digit)

Display of contents of malfunction (second digit)

Display 1 of malfunction in detail

Display 2 of malfunction in detail

*1			
	●	●	Master
	●	☀	Slave1
	☀	●	Slave2
	☀	☀	System

<Monitor mode>

To enter the monitor mode, push the MODE (BS1) button when in "Setting mode 1".

<Selection of setting item>

Push the SET (BS2) button and set the LED display to a setting item.

<Confirmation of malfunction 1>

Push the RETURN (BS3) button once to display "First digit" of malfunction code.

<Confirmation of malfunction 2>

Push the SET (BS2) button once to display "Second digit" of malfunction code.

<Confirmation of malfunction 3>

Push the SET (BS2) button once to display "malfunction location".

Detail description on next page.

<Confirmation of malfunction 4>

Push the SET (BS2) button once to display "master or slave 1 or slave 2" and "malfunction location".

Push the RETURN (BS3) button and switches to the initial status of "Monitor mode".

∗ Push the MODE (BS1) button and returns to "Setting mode 1".

Contents of malfunction		Malfunction code
Open phase/Power supply imbalance	Imbalance of inverter power supply voltage	P1
Faulty temperature sensor of inverter radiation fin	Faulty thermistor of inverter fin	P4
Refrigerant shortage	Refrigerant shortage alarm	U0
Abnormal power supply voltage	Insufficient Inverter voltage	U2
	Faulty charge of capacitor in main inverter circuit	
	Malfunction due to SP-PAM overvoltage	
	Malfunction due to P-N short circuit	
No implementation of test-run		U3
Transmission error between indoor and outdoor unit	I/O transmission error	U4
	I/O transmission error	
Incorrect setting in "setting mode 1"	COOL/HEAT selector is not set to IND	U7
Transmission error of other system	Indoor unit system abnormal in other system or other indoor unit system abnormal in own system	U9
Erroneous field setting	System transmission malfunction	UA
	Overconnection malfunction of indoor units	
	Malfunction of field setting	
	Refrigerant abnormal	
	Connection error (BP unit)	
Faulty system malfunction	Wiring error (Auto-address error)	UH
Conflict in wiring and piping, no setting for system	Conflict in wiring and piping	UF

☼: ON ●: OFF ◐:Blink

Malfunction code	Confirmation of malfunction 1							Confirmation of malfunction 2							Confirmation of malfunction 3							Confirmation of malfunction 4						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P
P1	◐			◐	●	●	●	◐			●	●	●	◐	◐			●	●	●	●	◐			●	●	*1	
P4								◐			●	◐	●	●	◐			●	●	●	●	◐			●	●		
U0	◐			◐	●	●	◐	◐			●	●	●	●	◐			●	●	●	●	◐			●	●	◐	◐
U2								◐			●	●	◐	●	◐			●	●	●	●	◐			●	●	*1	
															◐			●	●	●	●				●	◐		
															◐			●	●	●	●	◐			●	●	◐	●
															◐			●	●	●	●	◐			●	●	●	◐
U3								◐			●	●	◐	◐	◐			●	●	●	●	◐			●	●	◐	◐
															◐			●	●	●	●	◐			●	◐	◐	◐
U4								◐			●	◐	●	●	◐			●	●	●	●	◐			●	●	◐	◐
															◐			●	●	●	●	◐			●	◐	◐	◐
U7								◐			●	◐	◐	◐				●	●	●	●	◐			●	◐	◐	◐
U9								◐			◐	●	●	◐	◐			●	●	●	●	◐			●	●	◐	◐
UA								◐			◐	●	◐	●	◐			●	●	●	●	◐			●	●	◐	◐
															◐			●	●	●	●	◐			●	◐	◐	◐
															◐			●	●	●	●	◐			◐	●	◐	◐
															◐			●	●	●	◐	◐			●	●	◐	◐
															◐			●	●	◐	●	◐			●	◐	◐	◐
UH								◐			◐	●	◐	◐	◐			●	●	●	●	◐			●	●	◐	◐
UF								◐			◐	◐	◐	◐	◐			●	●	●	●	◐			●	●	◐	◐

Display of contents of malfunction (first digit)

Display of contents of malfunction (second digit)

Display 1 of malfunction in detail

Display 2 of malfunction in detail

*1

●	●	Master
●	◐	Slave1
◐	●	Slave2
◐	◐	System

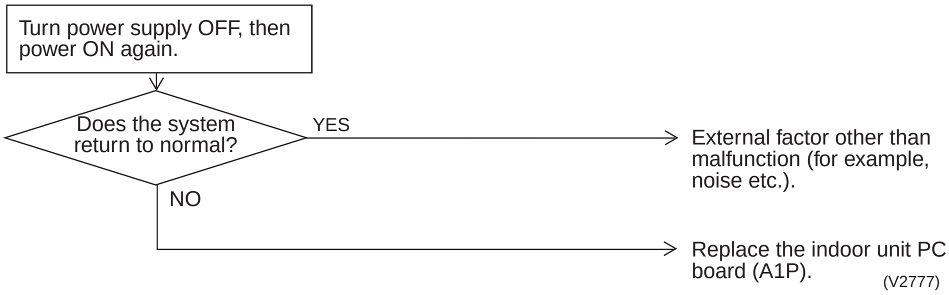
3. Troubleshooting by Indication on the Remote Controller

3.1 "A1" Indoor Unit: PC Board Defect

Remote Control Display	A1 Subcode 0
Applicable Models	All indoor unit models
Method of Malfunction Detection	Check data from E^{2}PROM.
Malfunction Decision Conditions	When data could not be correctly received from the E^{2}PROM E^{2}PROM: Type of nonvolatile memory. Maintains memory contents even when the power supply is turned off.
Supposed Causes	■ Defect of indoor unit PC board

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Turn power supply OFF, then power ON again.
Does the system return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Replace the indoor unit PC board (A1P).
(V2777)

3.2 "A6" Indoor Unit: Pump Error (M1P) or Other Water System Error

Remote Control Display

A6

Subcode 0

Applicable Models

All indoor unit models

Method of Malfunction Detection

Detection by failure of signal for detecting number of turns to come from the pump motor. Detection by failure ref. sensors.

Malfunction Decision Conditions

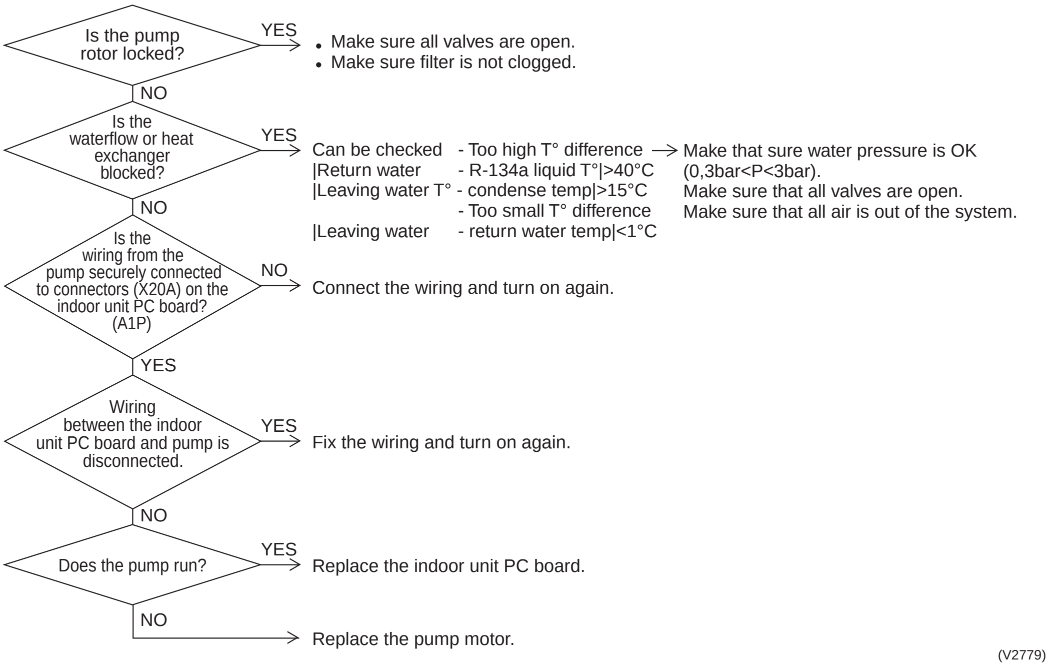
When number of turns cannot be detected even when output voltage to the pump motor is maximum. When water sensors are not within expected range.

Supposed Causes

- Pump rotor locked
- Disconnected or faulty wiring between pump connector and PC board (A1P)
- Blocked waterflow or heat exchanger (waterside)

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.

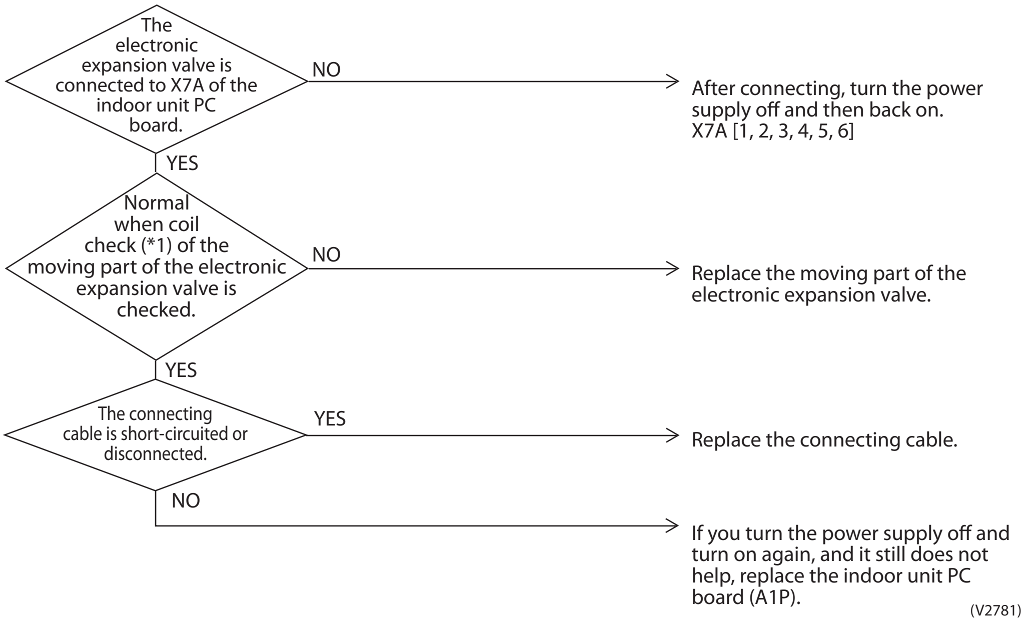

Is the pump rotor locked?
YES
• Make sure all valves are open.
• Make sure filter is not clogged.
NO
Is the waterflow or heat exchanger blocked?
YES
Can be checked
|Return water
|Leaving water T°
|Leaving water
- Too high T° difference
- R-134a liquid T°|>40°C
- condense temp|>15°C
- Too small T° difference
- return water temp|<1°C
Make that sure water pressure is OK (0,3bar<P<3bar).
Make sure that all valves are open.
Make sure that all air is out of the system.
NO
Is the wiring from the pump securely connected to connectors (X20A) on the indoor unit PC board? (A1P)
NO
Connect the wiring and turn on again.
YES
Wiring between the indoor unit PC board and pump is disconnected.
YES
Fix the wiring and turn on again.
NO
Does the pump run?
YES
Replace the indoor unit PC board.
NO
Replace the pump motor.
(V2779)

3.3 "A9" Indoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (K1E) R-410A circuit

Remote Control Display	A9 Subcode 0
Applicable Models	All indoor and outdoor unit models
Method of Malfunction Detection	
Malfunction Decision Conditions	
Supposed Causes	■ Malfunction of moving part of electronic expansion valve ■ Defect of indoor unit PC board (A1P) ■ Defect of connecting cable, bad wire

Troubleshooting

⚠ Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The electronic expansion valve is connected to X7A of the indoor unit PC board.
NO
After connecting, turn the power supply off and then back on. X7A [1, 2, 3, 4, 5, 6]
YES
Normal when coil check (*1) of the moving part of the electronic expansion valve is checked.
NO
Replace the moving part of the electronic expansion valve.
YES
The connecting cable is short-circuited or disconnected.
YES
Replace the connecting cable.
NO
If you turn the power supply off and turn on again, and it still does not help, replace the indoor unit PC board (A1P).
(V2781)

∗1: Coil check method for the moving part of the electronic expansion valve
Discount the electronic expansion valve from the PC board and check the continuity between the connector pins.

(Normal)

Pin No.	1. White	2. Yellow	3. Orange	4. Blue	5. Red	6. Brown
1. White		×	☼ Approx. 300Ω	×	☼ Approx. 150Ω	×
2. Yellow			×	☼ Approx. 300Ω	×	⌖ Approx. 150Ω
3. Orange				×	☼ Approx. 150Ω	×
4. Blue					×	☼ Approx. 150Ω
5. Red						×
6. Brown						

☼: Continuity
×: No continuity

3.4 “AE” Indoor Unit: Water Circuit Error

Remote Control Display

AE

Subcode 0

Applicable Models

All indoor unit models

Method of Malfunction Detection

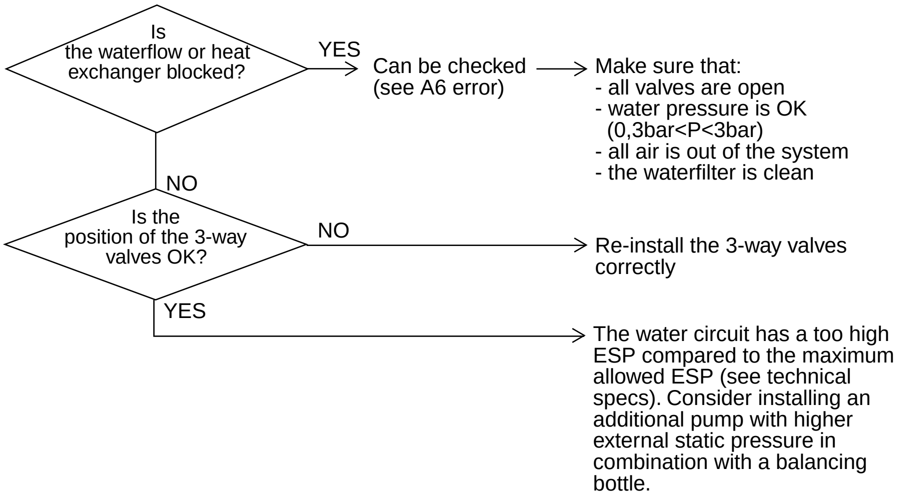
Malfunction Decision Conditions

Supposed Causes

- Blocked waterflow or heat exchanger (waterside).
- The water circuit has a too high ESP (external static pressure).

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the waterflow or heat exchanger blocked?
YES
Can be checked (see A6 error)
Make sure that:
- all valves are open
- water pressure is OK (0,3bar<P<3bar)
- all air is out of the system
- the waterfilter is clean
NO
Is the position of the 3-way valves OK?
NO
Re-install the 3-way valves correctly
YES
The water circuit has a too high ESP compared to the maximum allowed ESP (see technical specs). Consider installing an additional pump with higher external static pressure in combination with a balancing bottle.

3.5 "AJ" Indoor Unit: Malfunction of Capacity Determination Device

Remote Control Display

AJ

Subcode 0

Applicable Models

All indoor unit models

Method of Malfunction Detection

Capacity is determined according to resistance of the capacity setting adapter and the memory inside the IC memory on the indoor unit PC board, and whether the value is normal or abnormal is determined.

Malfunction Decision Conditions

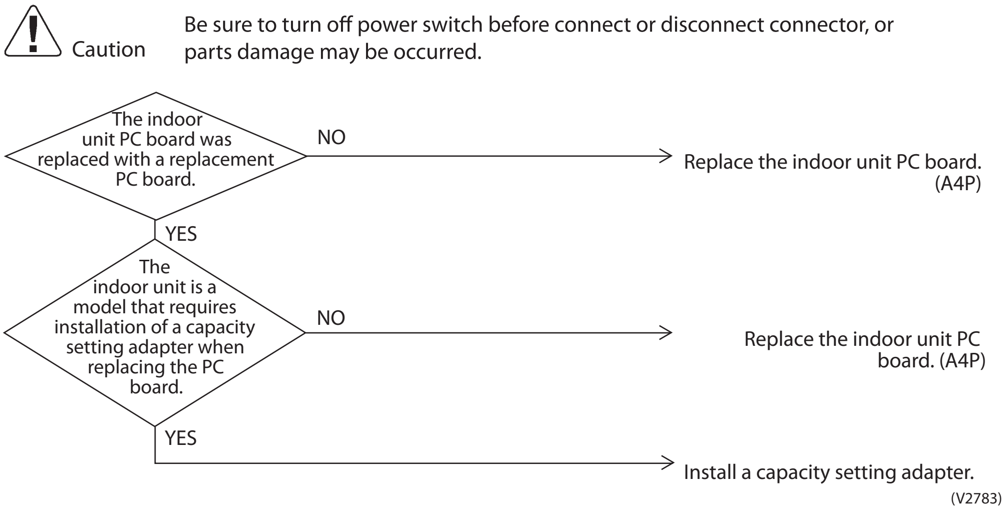
Operation and:

1. When the capacity code is not contained in the PC board's memory, and the capacity setting adapter is not connected.
2. When a capacity that doesn't exist for that unit is set.

Supposed Causes

- You have forgotten to install the capacity setting adapter.
- Defect of indoor unit PC board (A4P).

Troubleshooting

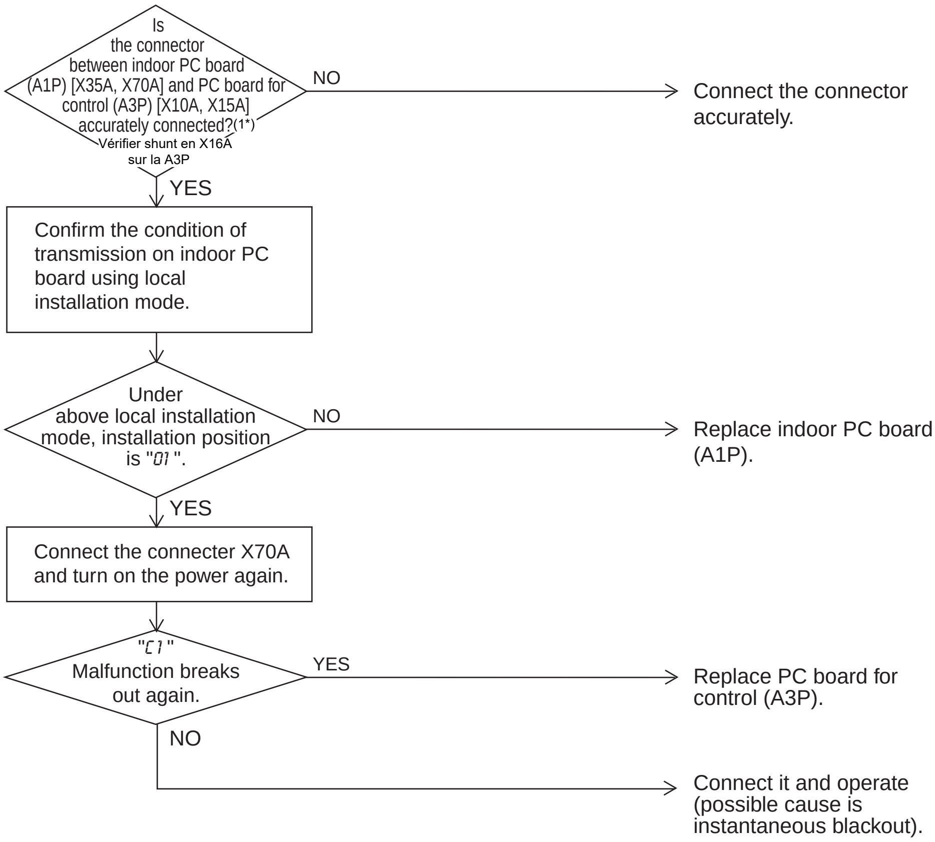

Caution
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.
The indoor unit PC board was replaced with a replacement PC board.
NO
Replace the indoor unit PC board. (A4P)
YES
The indoor unit is a model that requires installation of a capacity setting adapter when replacing the PC board.
NO
Replace the indoor unit PC board. (A4P)
YES
Install a capacity setting adapter.
(V2783)

3.6 "C1" Indoor Unit: Failure of Transmission (Between Indoor unit PC Board and Control PC Board)

Remote Control Display	C1 Subcode 0
Applicable Models	All indoor unit models
Method of Malfunction Detection	Check the condition of transmission between indoor PC board (A1P) and PC board for control (A3P) using computer.
Malfunction Decision Conditions	When normal transmission is not conducted for certain duration.
Supposed Causes	■ Connection defect of the connecter between indoor PC board (A1P) and PC board for control (A3P) (communication problem). ■ Malfunction of indoor PC board (A1P). ■ Malfunction of PC board for control (A3P). ■ External factor, such as instantaneous blackout.

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Is the connector between indoor PC board (A1P) [X35A, X70A] and PC board for control (A3P) [X10A, X15A] accurately connected?(1*)
Vérifier shunt en X16A sur la A3P
NO
Connect the connector accurately.
YES
Confirm the condition of transmission on indoor PC board using local installation mode.
Under above local installation mode, installation position is "01".
NO
Replace indoor PC board (A1P).
YES
Connect the connecter X70A and turn on the power again.
"C1" Malfunction breaks out again.
YES
Replace PC board for control (A3P).
NO
Connect it and operate (possible cause is instantaneous blackout).

∗1. Pull out and insert the connecter once and check it is absolutely connected.

3.7 "C4" Indoor Unit: Malfunction of Thermistor (R3T) Liquid Thermistor R-410A

Remote Control Display

C4

Subcode 0

Applicable Models

All indoor unit models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by liquid thermistor.

Malfunction Decision Conditions

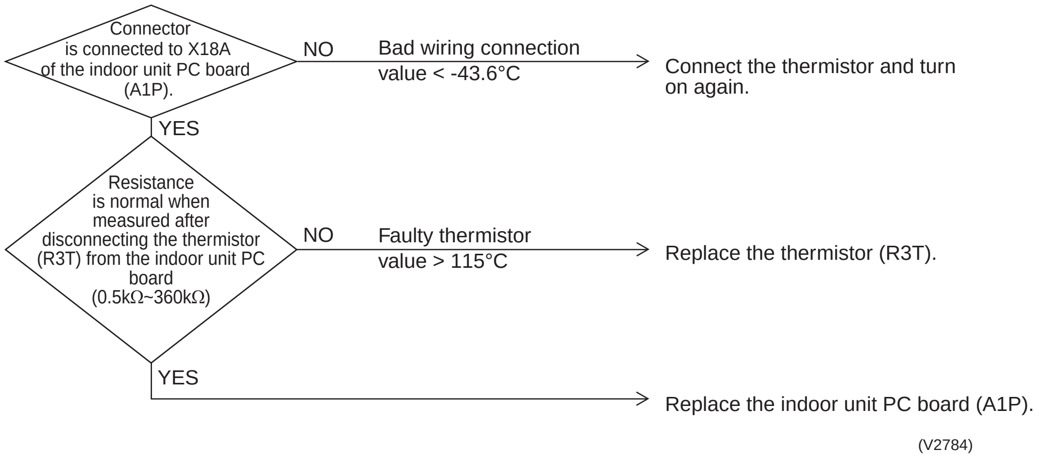
When the liquid thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of thermistor (R3T) for liquid pipe
- Defect of indoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Connector is connected to X18A of the indoor unit PC board (A1P).
NO
Bad wiring connection value < -43.6°C
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R3T) from the indoor unit PC board (0.5kΩ~360kΩ)
NO
Faulty thermistor value > 115°C
Replace the thermistor (R3T).
YES
Replace the indoor unit PC board (A1P).
(V2784)

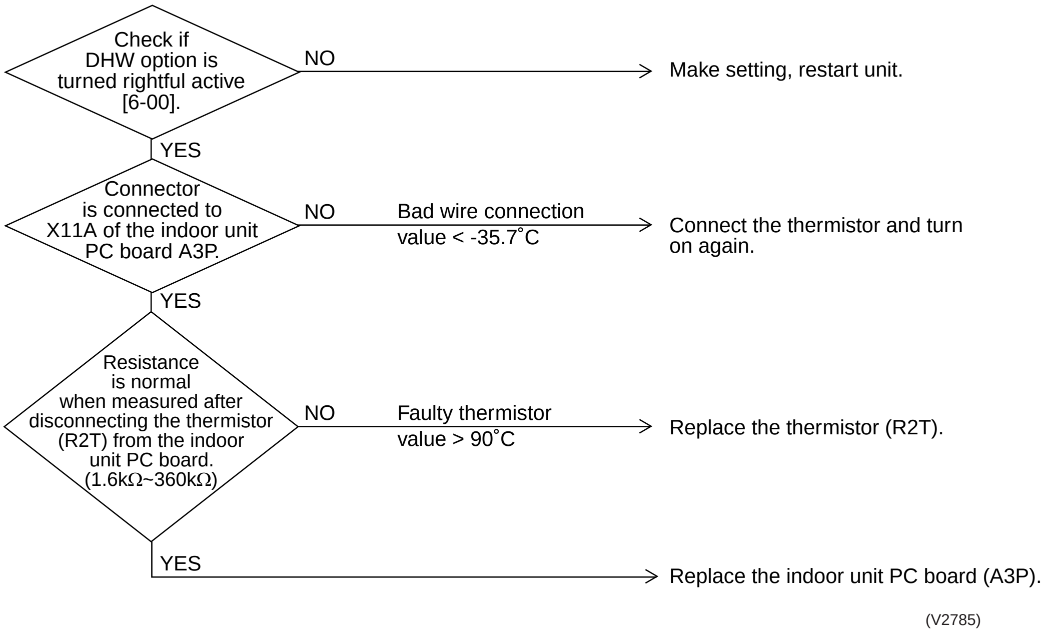
∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.8 "C5" Indoor Unit: Malfunction of Tank Thermistor (R2T)

Remote Control Display	C5 Subcode 0
Applicable Models	All indoor unit models
Method of Malfunction Detection	Malfunction detection is carried out by temperature detected by tank thermistor.
Malfunction Decision Conditions	When the tank thermistor becomes disconnected or shorted while the unit is running.
Supposed Causes	■ Defect of indoor unit tank thermistor (R2T) ■ Defect of indoor unit PC board (A3P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Check if DHW option is turned rightful active [6-00].
NO
Make setting, restart unit.
YES
Connector is connected to X11A of the indoor unit PC board A3P.
NO
Bad wire connection
value < -35.7˚C
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R2T) from the indoor unit PC board. (1.6kΩ~360kΩ)
NO
Faulty thermistor
value > 90˚C
Replace the thermistor (R2T).
YES
Replace the indoor unit PC board (A3P).
(V2785)

∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.9 "C9" Indoor Unit: Return Water Thermistor (R4T)

Remote Control Display

C9

Subcode 0

Applicable Models

AII indoor unit models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by return water temperature thermistor.

Malfunction Decision Conditions

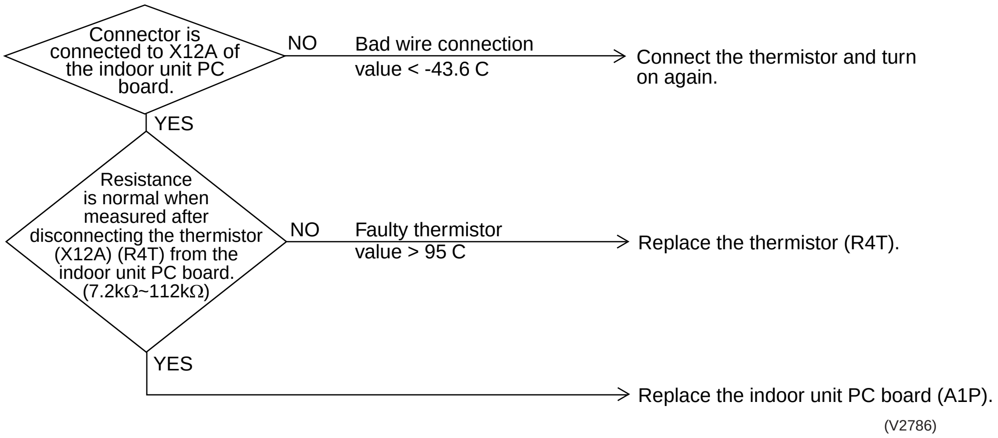
When the return water temperature thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of indoor unit thermistor (R4T) for water return
- Defect of indoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Connector is connected to X12A of the indoor unit PC board.
NO
Bad wire connection
value < -43.6 C
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (X12A) (R4T) from the indoor unit PC board. (7.2kΩ~112kΩ)
NO
Faulty thermistor
value > 95 C
Replace the thermistor (R4T).
YES
Replace the indoor unit PC board (A1P).
(V2786)

∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.10 "CA" Indoor Unit: Leaving Water Thermistor Error (R5T)

Remote Control Display

CA

Subcode 0

Applicable Models

AII indoor unit models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by leaving water temperature thermistor.

Malfunction Decision Conditions

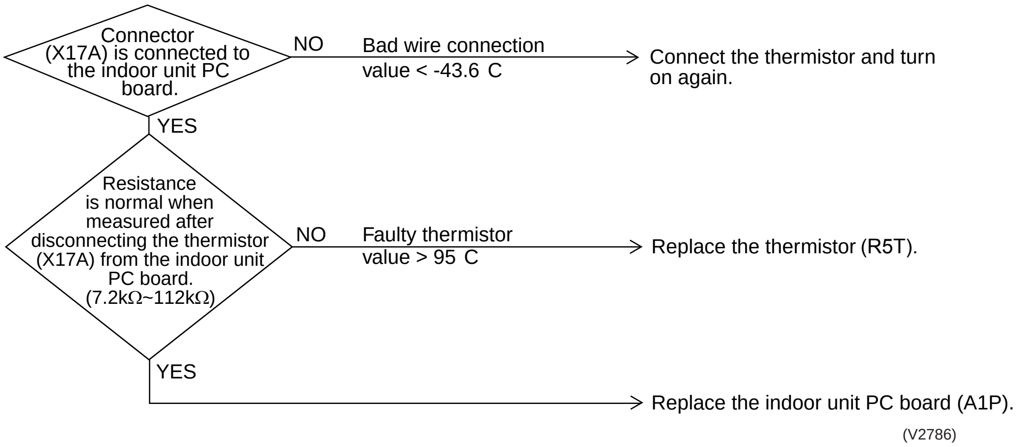
When the leaving water temperature thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of indoor unit thermistor for leaving water (R5T)
- Defect of indoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.

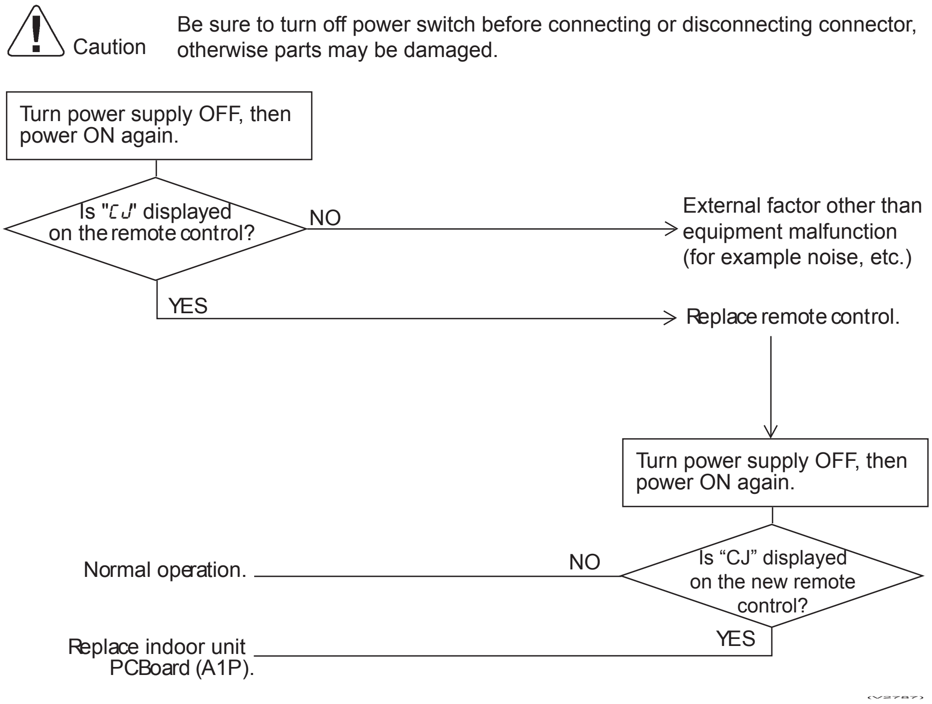

Connector (X17A) is connected to the indoor unit PC board.
NO
Bad wire connection
value < -43.6 C
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (X17A) from the indoor unit PC board. (7.2kΩ~112kΩ)
NO
Faulty thermistor
value > 95 C
Replace the thermistor (R5T).
YES
Replace the indoor unit PC board (A1P).
(V2786)

∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.11 "CJ" Indoor Unit: Malfunction of Thermostat Sensor in Remote Controller

Remote Control Display	CJ Subcode 0
Applicable Models	AII indoor unit models
Method of Malfunction Detection	Malfunction detection is carried out by temperature detected by remote control air temperature thermistor.
Malfunction Decision Conditions	When the remote control air temperature thermistor becomes disconnected or shorted while the unit is running.
Supposed Causes	■ Defect of remote control thermistor ■ Defect of remote control PC board ■ Defect of indoor PC board (A1P)

Troubleshooting


Caution
Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.
Turn power supply OFF, then power ON again.
Is "CJ" displayed on the remote control?
NO
External factor other than equipment malfunction (for example noise, etc.)
YES
Replace remote control.
Turn power supply OFF, then power ON again.
Is "CJ" displayed on the new remote control?
NO
Normal operation.
YES
Replace indoor unit PCBoard (A1P).

3.12 "E1" Outdoor Unit: PC Board Defect

Remote Control Display

E1

Applicable Models

ER*Q 011~016*
Related to: R-410A compressor
Subcode 3: see next page

Method of Malfunction Detection

Check data from E²PROM

Malfunction Decision Conditions

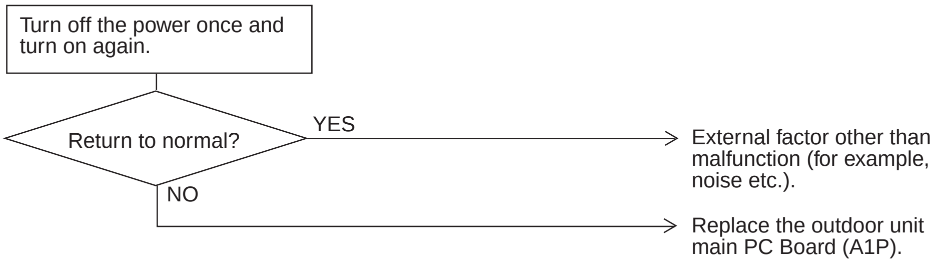
When data could not be correctly received from the E²PROM
E²PROM: Type of nonvolatile memory. Maintains memory contents even when the power supply is turned off.

Supposed Causes

- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Turn off the power once and turn on again.
Return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Replace the outdoor unit main PC Board (A1P).

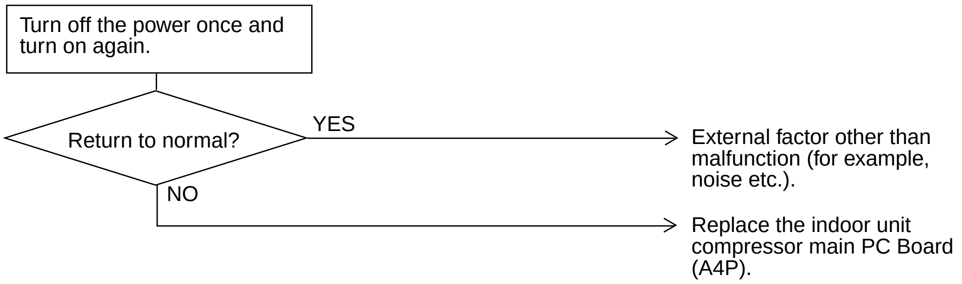
(V3064)

3.13 "E1" Indoor Unit: PC Board Defect

Remote Control Display	E1 Subcode 3
Applicable Models	All indoor units Related to: R-134a compressor
Method of Malfunction Detection	Check data from E²PROM
Malfunction Decision Conditions	When data could not be correctly received from the E²PROM E²PROM: Type of nonvolatile memory. Maintains memory contents even when the power supply is turned off.
Supposed Causes	■ Defect compressor main PC board (A4P)

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Turn off the power once and turn on again.
Return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Replace the indoor unit compressor main PC Board (A4P).

3.14 "E3" Outdoor Unit: Actuation of High Pressure Switch

Remote Control Display

E3

Subcode 1

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Abnormality is detected when the contact of the high pressure protection switch opens.

Malfunction Decision Conditions

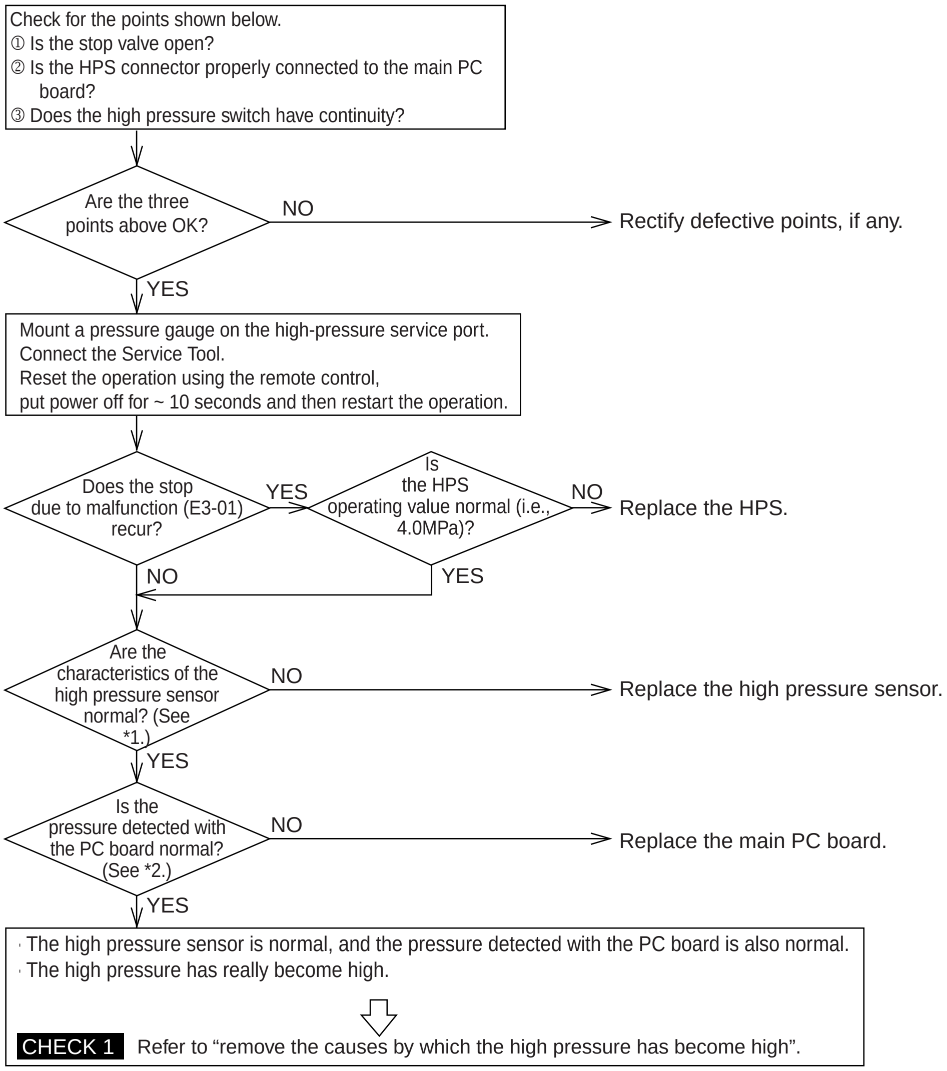
Error is generated when the HPS activation count reaches the number specific to the operation mode.
(Reference) Operating pressure of high pressure switch
Operating pressure: 4.0MPa
Reset pressure: 3.0MPa

Supposed Causes

- Actuation of outdoor unit high pressure switch
- Defect of High pressure switch
- Defect of outdoor unit PC board (A1P)
- Instantaneous power failure
- Faulty high pressure sensor

Troubleshooting

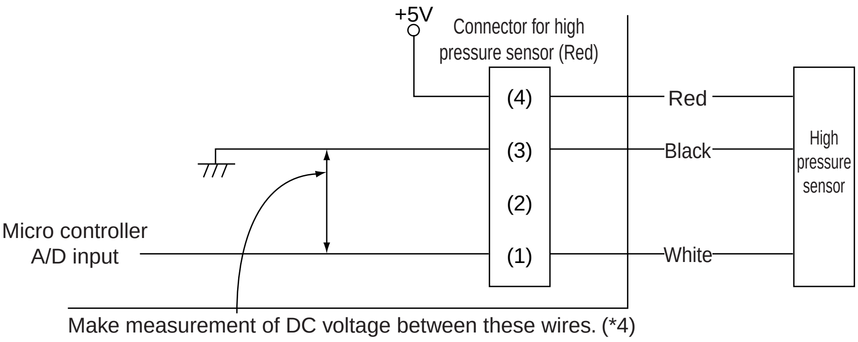
Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Check for the points shown below.
① Is the stop valve open?
② Is the HPS connector properly connected to the main PC board?
③ Does the high pressure switch have continuity?
Are the three points above OK?
NO
Rectify defective points, if any.
YES
Mount a pressure gauge on the high-pressure service port.
Connect the Service Tool.
Reset the operation using the remote control,
put power off for ~ 10 seconds and then restart the operation.
Does the stop due to malfunction (E3-01) recur?
YES
Is the HPS operating value normal (i.e., 4.0MPa)?
NO
Replace the HPS.
NO
YES
Are the characteristics of the high pressure sensor normal? (See *1.)
NO
Replace the high pressure sensor.
YES
Is the pressure detected with the PC board normal? (See *2.)
NO
Replace the main PC board.
YES
The high pressure sensor is normal, and the pressure detected with the PC board is also normal.
The high pressure has really become high.
CHECK 1
Refer to "remove the causes by which the high pressure has become high".

*1: Make a comparison between the voltage of the pressure sensor (*4) and that read by the pressure gauge.
(As to the voltage of the pressure sensor, make measurement of voltage at the connector, and then convert it to pressure.)

*2: Make a comparison between the high pressure value checked with the Service Tool. and the voltage of the pressure sensor (see *1).

*3: Make measurement of voltage of the pressure sensor.


+5V
Connector for high pressure sensor (Red)
(4)
(3)
(2)
(1)
Red
Black
White
High pressure sensor
Micro controller A/D input
Make measurement of DC voltage between these wires. (*4)

Check No.1 : Refer to information on page 219.

3.15 "E3" Indoor Unit: Actuation of High Pressure Switch

Remote Control Display

E3

Subcode 12

Applicable Models

All indoor units

Method of Malfunction Detection

Abnormality is detected when the contact of the high pressure protection switch opens.

Malfunction Decision Conditions

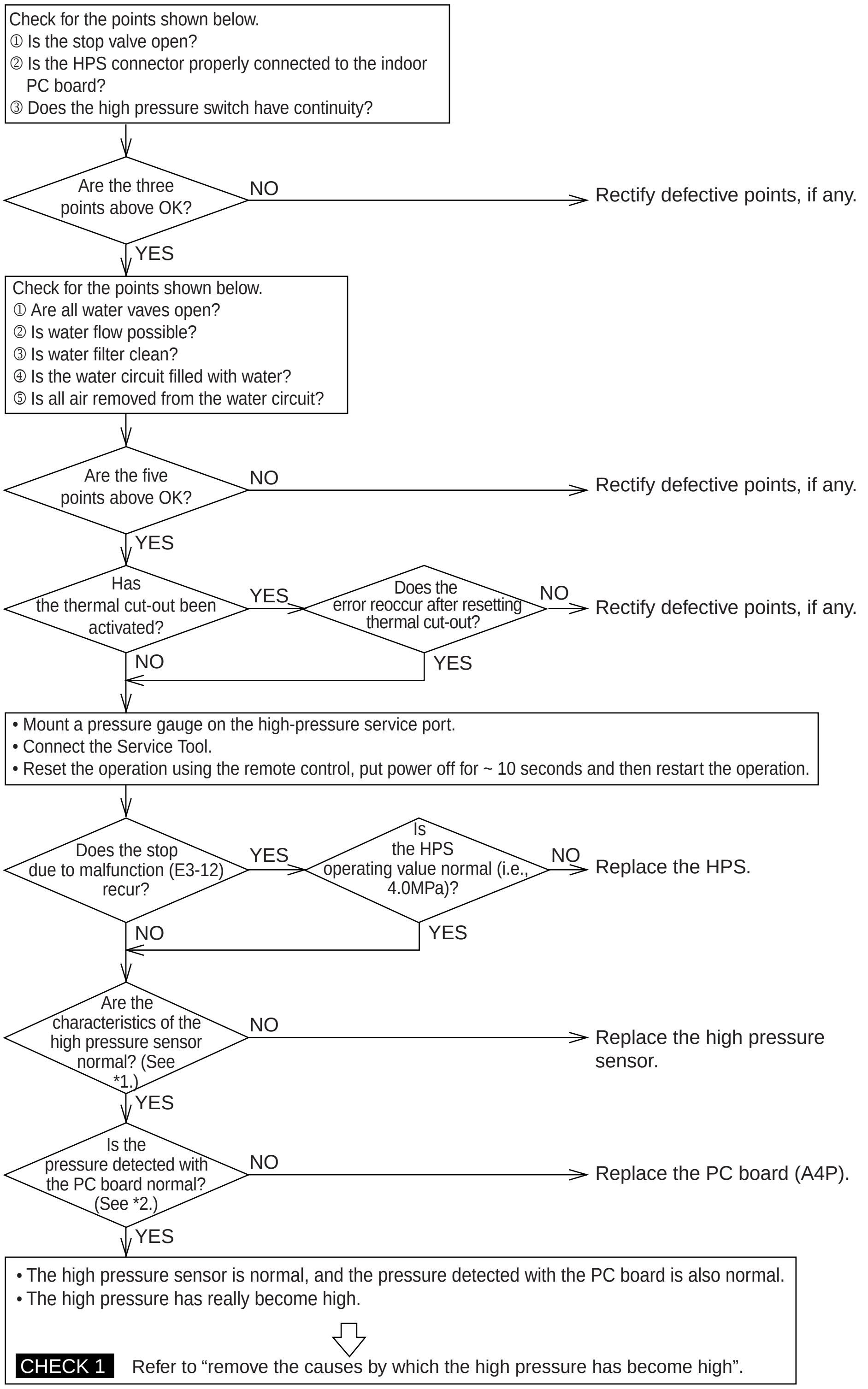
Error is generated when the HPS activation count reaches the number specific to the operation mode.
(Reference) Operating pressure of high pressure switch
Operating pressure: 3.8MPa
Reset pressure: 2.7MPa

Supposed Causes

- Actuation of indoor unit high pressure switch
- Defect of High pressure switch
- Defect of Indoor unit PC board (A4P)
- Faulty high pressure sensor
- Refrigerant blockage
- Water blockage
- Thermal cut out error (Q2L)

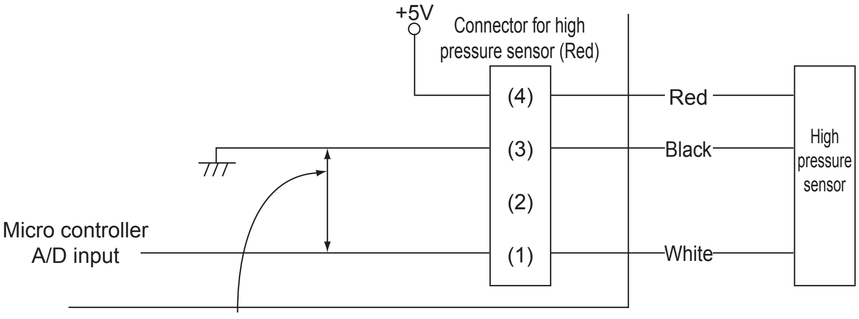
⚠**Warning**: CAPACITOR SHOCK HAZARD. The capacitors (top surfaces) can hold up to 220V. Use correct precautions when servicing.

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Check for the points shown below.
① Is the stop valve open?
② Is the HPS connector properly connected to the indoor PC board?
③ Does the high pressure switch have continuity?
Are the three points above OK?
NO
Rectify defective points, if any.
YES
Check for the points shown below.
① Are all water vaves open?
② Is water flow possible?
③ Is water filter clean?
④ Is the water circuit filled with water?
⑤ Is all air removed from the water circuit?
Are the five points above OK?
NO
Rectify defective points, if any.
YES
Has the thermal cut-out been activated?
YES
Does the error reoccur after resetting thermal cut-out?
NO
Rectify defective points, if any.
NO
YES
• Mount a pressure gauge on the high-pressure service port.
• Connect the Service Tool.
• Reset the operation using the remote control, put power off for ~ 10 seconds and then restart the operation.
Does the stop due to malfunction (E3-12) recur?
YES
Is the HPS operating value normal (i.e., 4.0MPa)?
NO
Replace the HPS.
NO
YES
Are the characteristics of the high pressure sensor normal? (See *1.)
NO
Replace the high pressure sensor.
YES
Is the pressure detected with the PC board normal? (See *2.)
NO
Replace the PC board (A4P).
YES
• The high pressure sensor is normal, and the pressure detected with the PC board is also normal.
• The high pressure has really become high.
CHECK 1
Refer to “remove the causes by which the high pressure has become high”.

Check No.1 : Refer to information on page 219.

*1: Make a comparison between the voltage of the pressure sensor (*4) and that read by the pressure gauge.(As to the voltage of the pressure sensor, make measurement of voltage at the connector, and then convert it to pressure.)
*2: Make a comparison between the high pressure value checked with the Service Tool and the voltage of the pressure sensor (see *1)
*3: Make measurement of voltage of the pressure sensor.


+5V
Connector for high pressure sensor (Red)
(4)
(3)
(2)
(1)
Red
Black
White
High pressure sensor
Micro controller A/D input

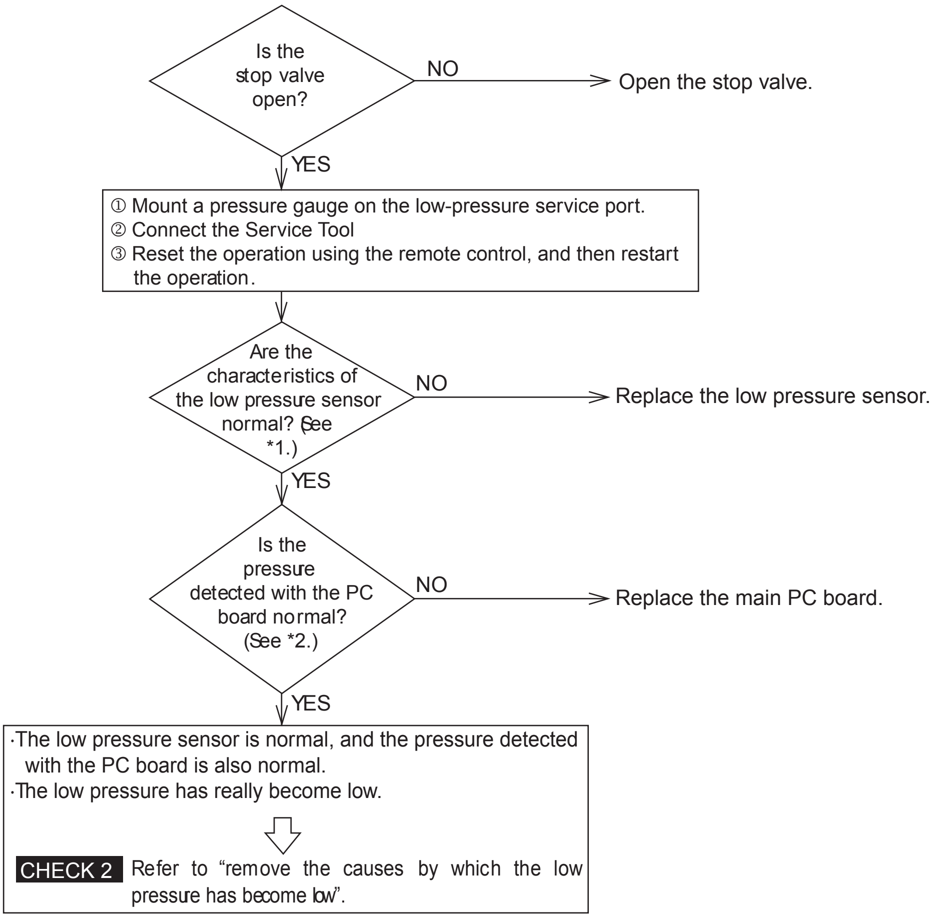
Make measurement of DC voltage between these wires. (*4)

3.16 ″E4″ Outdoor Unit: Actuation of Low Pressure Sensor

Remote Control Display	E4
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Abnormality is detected by the pressure value with the low pressure sensor.
Malfunction Decision Conditions	Error is generated when the low pressure is dropped under specific pressure. Operating pressure: 0.07MPa
Supposed Causes	■ Abnormal drop of low pressure (Lower than 0.07MPa) ■ Defect of low pressure sensor ■ Defect of outdoor unit PC board (A1P) ■ Stop valve is not opened.

Troubleshooting

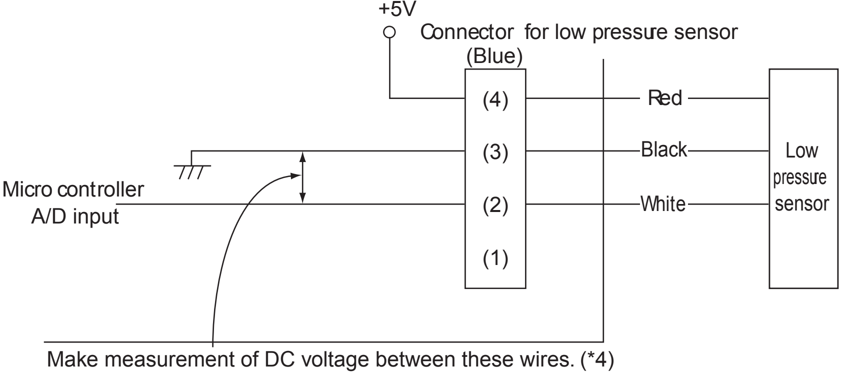
Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Is the stop valve open?
NO
Open the stop valve.
YES
① Mount a pressure gauge on the low-pressure service port.
② Connect the Service Tool
③ Reset the operation using the remote control, and then restart the operation.
Are the characteristics of the low pressure sensor normal? (See *1.)
NO
Replace the low pressure sensor.
YES
Is the pressure detected with the PC board normal? (See *2.)
NO
Replace the main PC board.
YES
·The low pressure sensor is normal, and the pressure detected with the PC board is also normal.
·The low pressure has really become low.
CHECK 2
Refer to "remove the causes by which the low pressure has become low".

*1: Make a comparison between the voltage of the pressure sensor (*4) and that read by the pressure gauge.
(As to the voltage of the pressure sensor, make measurement of voltage at the connector, and and then convert it to pressure.)

*2: Make a comparison between the low pressure value checked with the Service Tool and the voltage of the pressure sensor (see *1)

*3: Make measurement of voltage of the pressure sensor.

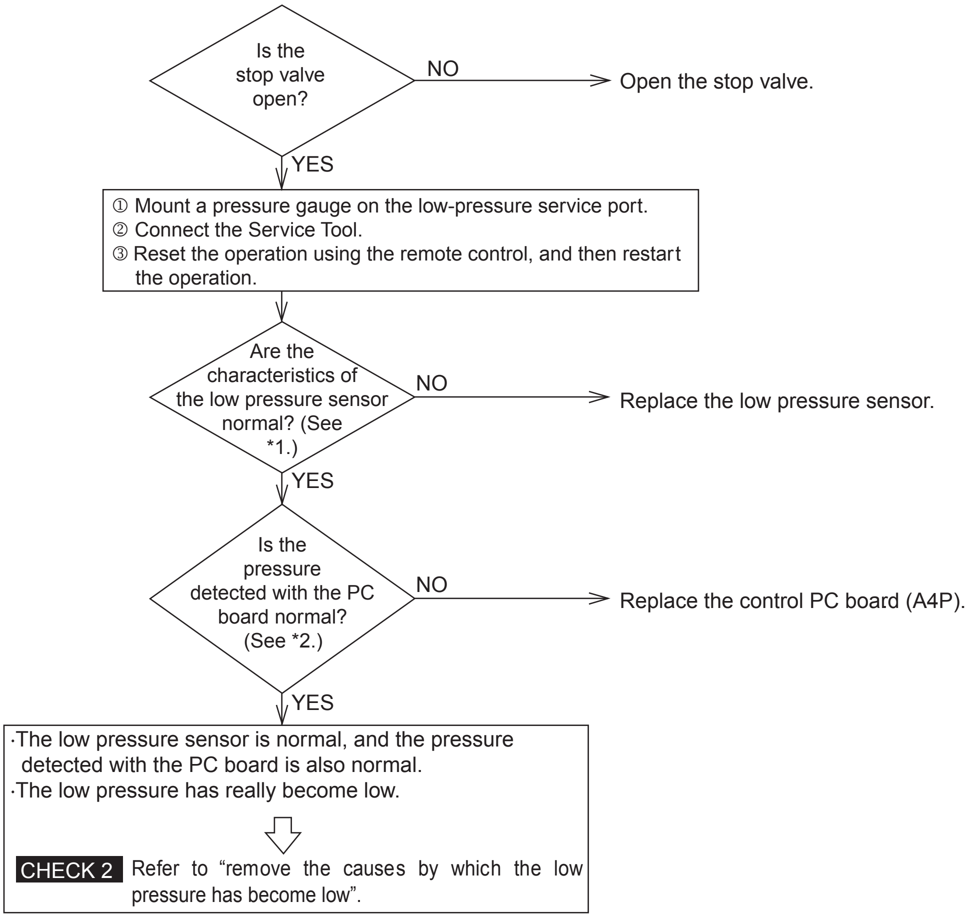

+5V
Connector for low pressure sensor (Blue)
(4)
(3)
(2)
(1)
Red
Black
White
Low pressure sensor
Micro controller A/D input
Make measurement of DC voltage between these wires. (*4)

Check No.2 : ∗ Refer to information on page 220.

3.17 "E4" Indoor Unit: Actuation of Low Pressure Sensor

Remote Control Display	E4 Subcode 6
Applicable Models	All indoor units
Method of Malfunction Detection	Abnormality is detected by the pressure value with the low pressure sensor.
Malfunction Decision Conditions	Error is generated when the low pressure is dropped under specific pressure. Operating pressure: 0.07MPa
Supposed Causes	■ Abnormal drop of low pressure (Lower than 0.07MPa) ■ Defect of low pressure sensor ■ Defect control PC board (A4P) ■ Stop valve is not opened.
Troubleshooting	⚠ **Warning**: CAPACITOR SHOCK HAZARD. The capacitors (top surfaces) can hold up to 220V. Use correct precautions when servicing.

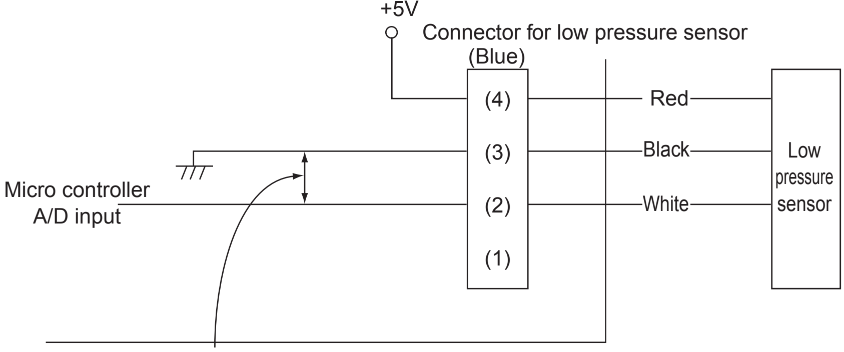
Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Is the stop valve open?
NO
Open the stop valve.
YES
① Mount a pressure gauge on the low-pressure service port.
② Connect the Service Tool.
③ Reset the operation using the remote control, and then restart the operation.
Are the characteristics of the low pressure sensor normal? (See *1.)
NO
Replace the low pressure sensor.
YES
Is the pressure detected with the PC board normal? (See *2.)
NO
Replace the control PC board (A4P).
YES
·The low pressure sensor is normal, and the pressure detected with the PC board is also normal.
·The low pressure has really become low.
CHECK 2
Refer to "remove the causes by which the low pressure has become low".

*1: Make a comparison between the voltage of the pressure sensor (*4) and that read by the pressure gauge.
(As to the voltage of the pressure sensor, make measurement of voltage at the connector, and then convert it to pressure.)

*2: Make a comparison between the low pressure value checked with the Service Tool and the voltage of the pressure sensor (see *1).

*3: Make measurement of voltage of the pressure sensor.


+5V
Connector for low pressure sensor (Blue)
(4)
(3)
(2)
(1)
Red
Black
White
Low pressure sensor
Micro controller A/D input

Make measurement of DC voltage between these wires. (*4)

Check No.2 : ∗ Refer to information on page 219.

3.18 "E5" Outdoor Unit: Inverter Compressor Motor Lock

Remote Control Display

E5

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Inverter PC board takes the position signal from UVW line connected between the inverter and compressor, and the malfunction is detected when any abnormality is observed in the phase-current waveform.

Malfunction Decision Conditions

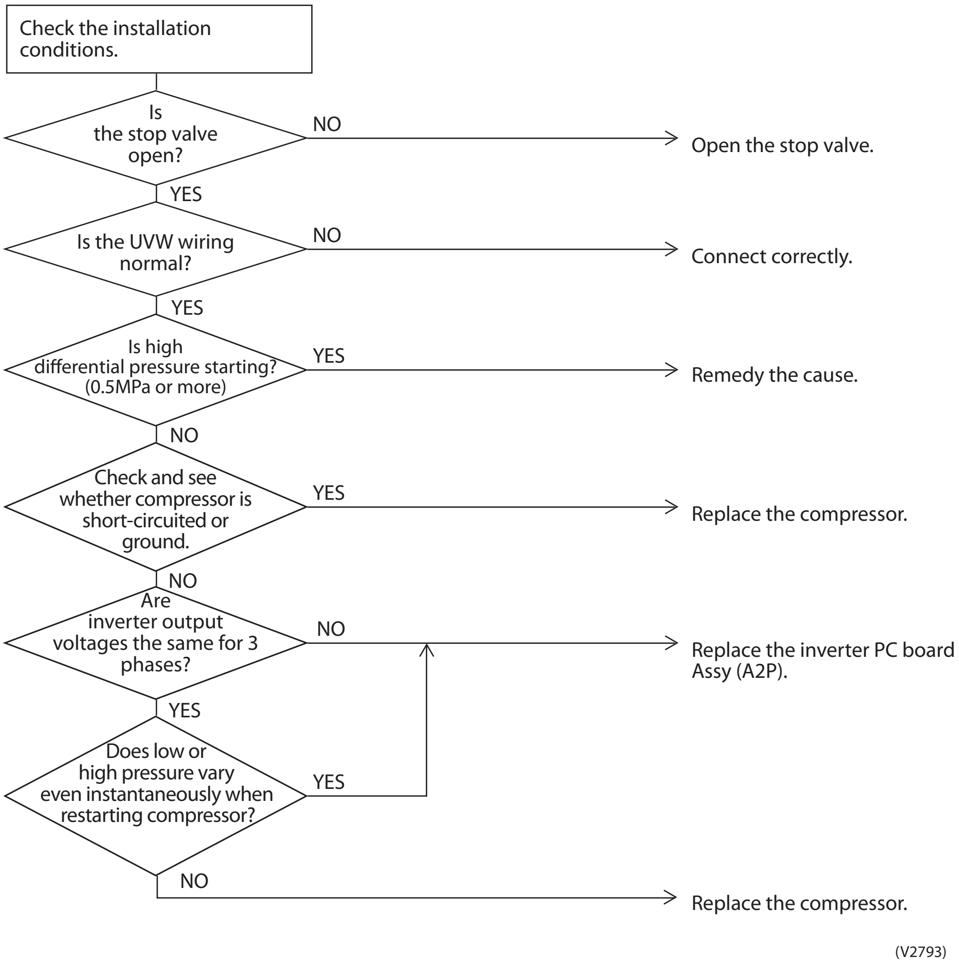
This malfunction will be output when the inverter compressor motor does not start up even in forced startup mode.

Supposed Causes

- ■ Compressor lock
- ■ High differential pressure (0.5MPa or more)
- ■ Incorrect UVW wiring
- ■ Faulty inverter PC board
- ■ Stop valve is left in closed.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Check the installation conditions.
Is the stop valve open?
NO
Open the stop valve.
YES
Is the UVW wiring normal?
NO
Connect correctly.
YES
Is high differential pressure starting? (0.5MPa or more)
YES
Remedy the cause.
NO
Check and see whether compressor is short-circuited or ground.
YES
Replace the compressor.
NO
Are inverter output voltages the same for 3 phases?
NO
Replace the inverter PC board Assy (A2P).
YES
Does low or high pressure vary even instantaneously when restarting compressor?
YES
NO
Replace the compressor.
(V2793)

3.19 "E5" Indoor Unit: Inverter Compressor Motor Lock

Remote Control Display

E5

Subcode 6

Applicable Models

All indoor units

Method of Malfunction Detection

Inverter PC board takes the position signal from UVW line connected between the inverter and compressor, and the malfunction is detected when any abnormality is observed in the phase-current waveform.

Malfunction Decision Conditions

This malfunction will be output when the inverter compressor motor does not start up even in forced startup mode.

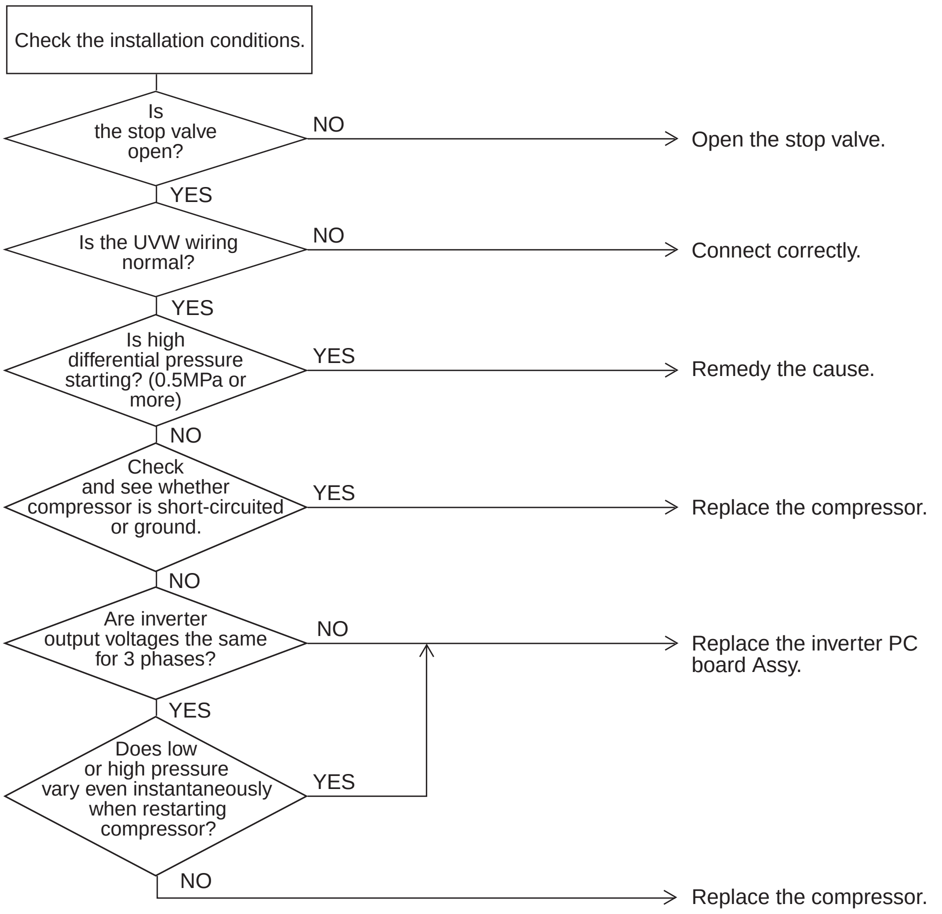
Supposed Causes

- Compressor lock (liquid suction (oil shortage))
- High differential pressure (0.5MPa or more)
- Incorrect UVW wiring
- Faulty inverter PC board
- Stop valve is left in closed.

Troubleshooting

⚠**Warning**: CAPACITOR SHOCK HAZARD. The capacitors (top surfaces) can hold up to 220V. Use correct precautions when servicing.

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Check the installation conditions.
Is the stop valve open?
NO
Open the stop valve.
YES
Is the UVW wiring normal?
NO
Connect correctly.
YES
Is high differential pressure starting? (0.5MPa or more)
YES
Remedy the cause.
NO
Check and see whether compressor is short-circuited or ground.
YES
Replace the compressor.
NO
Are inverter output voltages the same for 3 phases?
NO
Replace the inverter PC board Assy.
YES
Does low or high pressure vary even instantaneously when restarting compressor?
YES
NO
Replace the compressor.

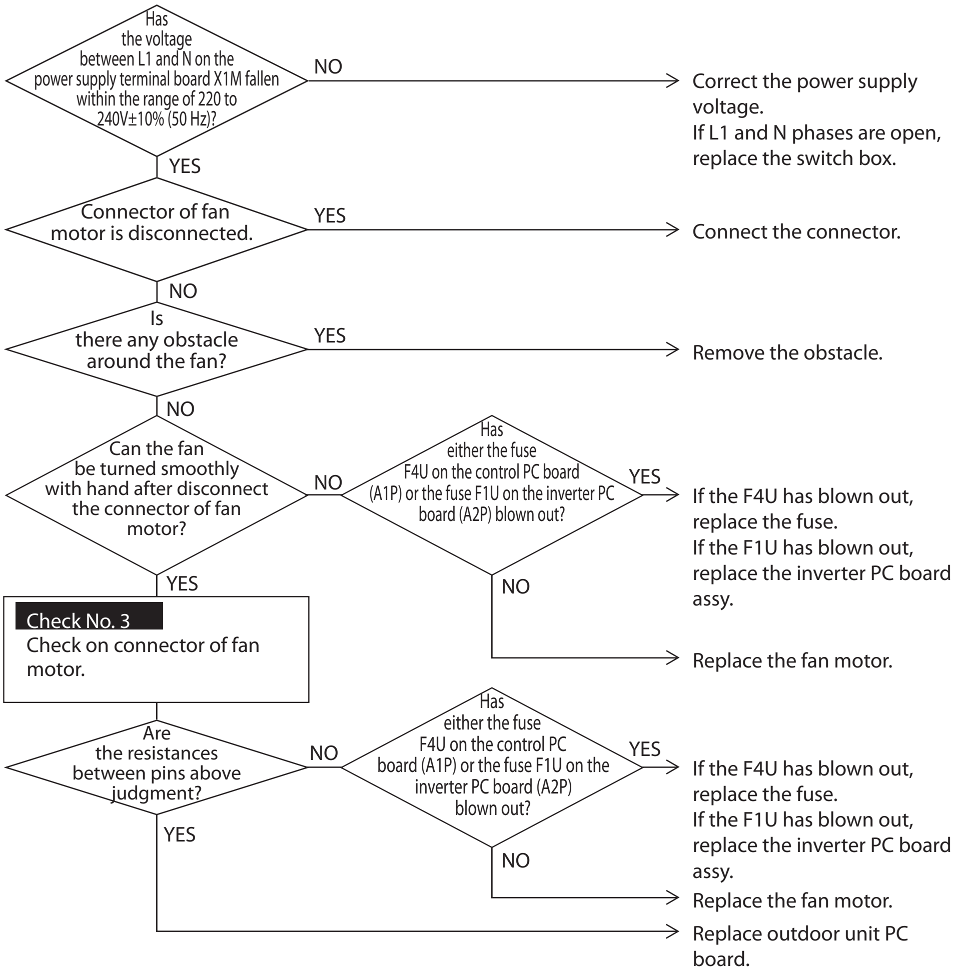
(V2793)

3.20 "E7" Malfunction of Outdoor Unit Fan Motor

Remote Control Display	E7
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Malfunction of fan motor system is detected according to the fan speed detected by hall IC when the fan motor runs.
Malfunction Decision Conditions	■ When the fan runs with speed less than a specified one for 6 seconds or more when the fan motor running conditions are met ■ When malfunction is generated 4 times, the system shuts down.
Supposed Causes	■ Malfunction of fan motor ■ The harness connector between fan motor and PC board is left in disconnected, or faulty connector ■ Fan does not run due to foreign matters tangled ■ Clearing condition: Operate for 5 minutes (normal) ■ Open phase L1 or open phase N.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Has the voltage between L1 and N on the power supply terminal board X1M fallen within the range of 220 to 240V±10% (50 Hz)?
NO
Correct the power supply voltage.
If L1 and N phases are open, replace the switch box.
YES
Connector of fan motor is disconnected.
YES
Connect the connector.
NO
Is there any obstacle around the fan?
YES
Remove the obstacle.
NO
Can the fan be turned smoothly with hand after disconnect the connector of fan motor?
NO
Has either the fuse F4U on the control PC board (A1P) or the fuse F1U on the inverter PC board (A2P) blown out?
YES
If the F4U has blown out, replace the fuse.
If the F1U has blown out, replace the inverter PC board assy.
NO
Replace the fan motor.
YES
Check No. 3
Check on connector of fan motor.
Are the resistances between pins above judgment?
NO
Has either the fuse F4U on the control PC board (A1P) or the fuse F1U on the inverter PC board (A2P) blown out?
YES
If the F4U has blown out, replace the fuse.
If the F1U has blown out, replace the inverter PC board assy.
NO
Replace the fan motor.
YES
Replace outdoor unit PC board.

Check No.3 : ∗ Refer to information on page 221.

3.21 "E9" Outdoor Unit: Malfunction of Moving Part of Electronic Expansion Valve

Remote Control Display

E9

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Check disconnection of connector
Check continuity of expansion valve coil

Malfunction Decision Conditions

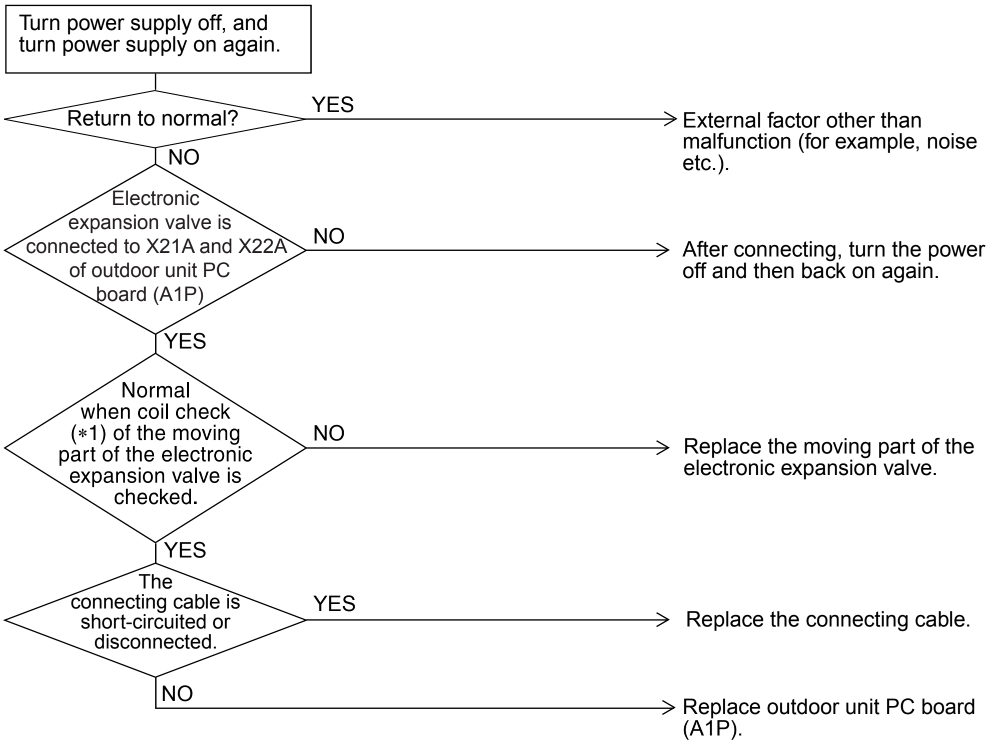
Error is generated under no common power supply when the power is on.

Supposed Causes

- Defect of moving part of electronic expansion valve
- Defect of outdoor unit PC board (A1P)
- Defect of connecting cable

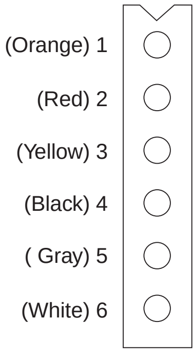
Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Turn power supply off, and turn power supply on again.
Return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Electronic expansion valve is connected to X21A and X22A of outdoor unit PC board (A1P)
NO
After connecting, turn the power off and then back on again.
YES
Normal when coil check (∗1) of the moving part of the electronic expansion valve is checked.
NO
Replace the moving part of the electronic expansion valve.
YES
The connecting cable is short-circuited or disconnected.
YES
Replace the connecting cable.
NO
Replace outdoor unit PC board (A1P).

(V3067)

∗1: Coil check method for the moving part of the electronic expansion valve
Disconnect the electronic expansion valve from the PC board and check the continuity between the connector pins.



(V3067)

(Normal)

Pin No.	1. Orange	2. Red	3. Yellow	4. Black	5. Gray	6. White
1. Orange		×	☼ Approx. 100Ω	×	☼ Approx. 50Ω	×
2. Red			×	☼ Approx. 100Ω	×	☼ Approx. 50Ω
3. Yellow				×	☼ Approx. 50Ω	×
4. Black					×	☼ Approx. 50Ω
5. Gray						×
6. White						

☼: Continuity
×: No continuity

3.22 "E9" Indoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (K2E) R-134a circuit

Remote Control Display

E9

Subcode 17

Applicable Models

All indoor units
Expansion valve on R-134a

Method of Malfunction Detection

Check disconnection of connector
Check continuity of expansion valve coil

Malfunction Decision Conditions

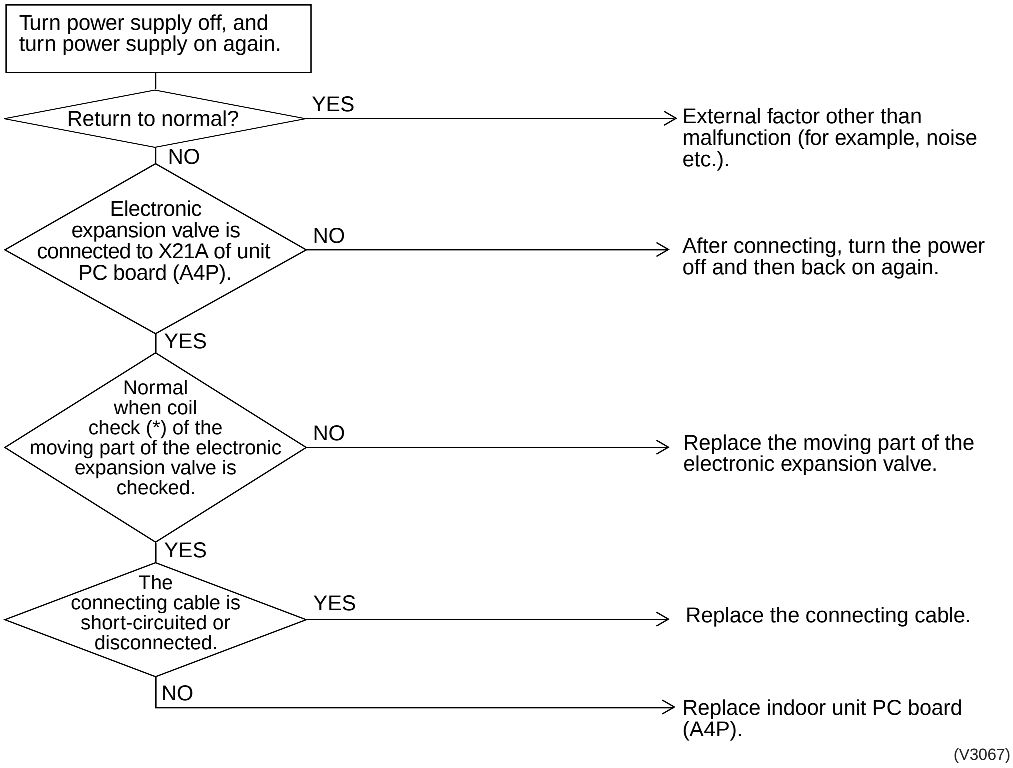
Error is generated under no common power supply when the power is on.

Supposed Causes

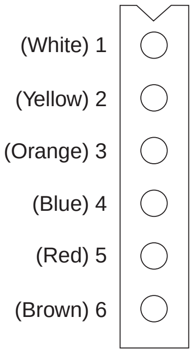
- Defect of moving part of electronic expansion valve
- Defect of indoor unit PC board (A4P)
- Defect of connecting cable

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Turn power supply off, and turn power supply on again.
Return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Electronic expansion valve is connected to X21A of unit PC board (A4P).
NO
After connecting, turn the power off and then back on again.
YES
Normal when coil check (*) of the moving part of the electronic expansion valve is checked.
NO
Replace the moving part of the electronic expansion valve.
YES
The connecting cable is short-circuited or disconnected.
YES
Replace the connecting cable.
NO
Replace indoor unit PC board (A4P).
(V3067)

∗1: Coil check method for the moving part of the electronic expansion valve
Disconnect the electronic expansion valve from the PC board and check the continuity between the connector pins.



(V3067)

(Normal)

Pin No.	1. White	2. Yellow	3. Orange	4. Blue	5. Red	6. Brown
1. White		×	☼ Approx. 300Ω	×	☼ Approx. 150Ω	×
2. Yellow			×	☼ Approx. 300Ω	×	☼ Approx. 150Ω
3. Orange				×	☼ Approx. 150Ω	×
4. Blue					×	☼ Approx. 150Ω
5. Red						×
6. Brown						

☼: Continuity
×: No continuity

3.23 "F3" Outdoor Unit: Abnormal Discharge Pipe Temperature

Remote Control Display

F3

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Abnormality is detected according to the temperature detected by the discharge pipe temperature sensor.

Malfunction Decision Conditions

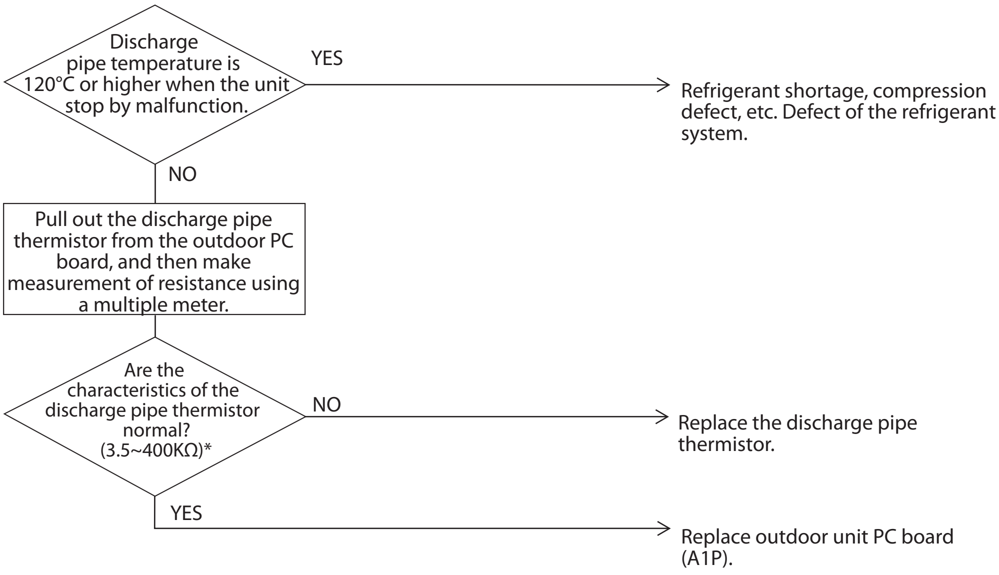
When the discharge pipe temperature rises to an abnormally high level
When the discharge pipe temperature rises suddenly

Supposed Causes

- Faulty discharge pipe temperature sensor
- Faulty connection of discharge pipe temperature sensor
- Faulty outdoor unit PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Discharge pipe temperature is 120°C or higher when the unit stop by malfunction.
YES
Refrigerant shortage, compression defect, etc. Defect of the refrigerant system.
NO
Pull out the discharge pipe thermistor from the outdoor PC board, and then make measurement of resistance using a multiple meter.
Are the characteristics of the discharge pipe thermistor normal? (3.5~400KΩ)*
NO
Replace the discharge pipe thermistor.
YES
Replace outdoor unit PC board (A1P).

(V3068)

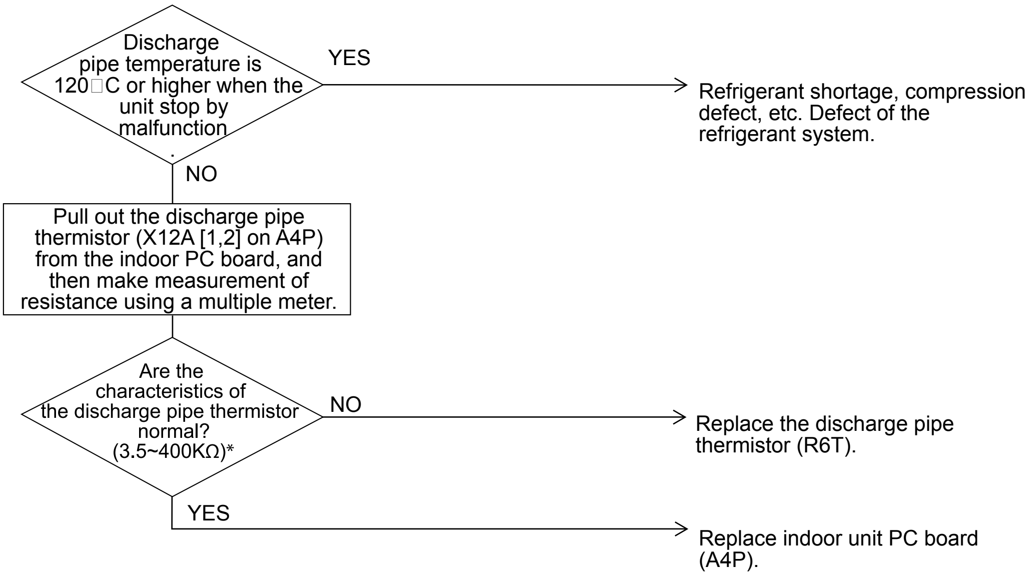
∗ Refer to "Thermistor Resistance / Temperature Characteristics" table on P251.

3.24 "F3" Indoor Unit: Abnormal Discharge Pipe Temperature

Remote Control Display	F3 Subcode 19
Applicable Models	All indoor units
Method of Malfunction Detection	Abnormality is detected according to the temperature detected by the discharge pipe temperature sensor.
Malfunction Decision Conditions	When the discharge pipe temperature rises to an abnormally high level When the discharge pipe temperature rises suddenly
Supposed Causes	■ Faulty discharge pipe temperature sensor (R6T) ■ Faulty connection of discharge pipe temperature sensor ■ Faulty indoor unit PC board

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connect or disconnect connector, or parts may be damaged.


Discharge pipe temperature is 120□C or higher when the unit stop by malfunction.
YES
Refrigerant shortage, compression defect, etc. Defect of the refrigerant system.
NO
Pull out the discharge pipe thermistor (X12A [1,2] on A4P) from the indoor PC board, and then make measurement of resistance using a multiple meter.
Are the characteristics of the discharge pipe thermistor normal? (3.5~400KΩ)*
NO
Replace the discharge pipe thermistor (R6T).
YES
Replace indoor unit PC board (A4P).

∗ Refer to "Thermistor Resistance / Temperature Characteristics" table on page 251.

3.25 "H9" Outdoor Unit: Malfunction of Thermistor (R1T) for Outdoor Air

Remote Control Display

H9

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Malfunction is detected from the temperature detected by the outdoor air thermistor.

Malfunction Decision Conditions

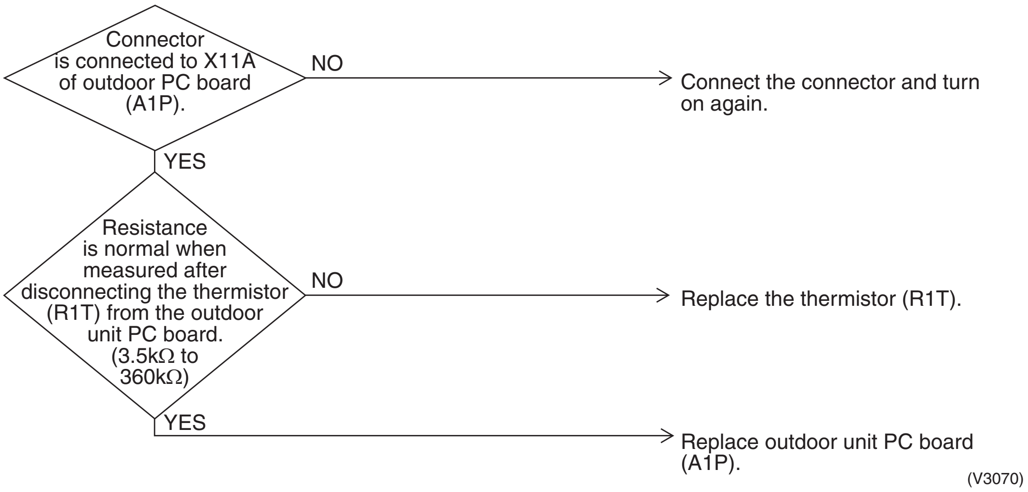
When the outside air temperature thermistor has short circuit or open circuit.

Supposed Causes

- Defect of thermistor (R1T) for outdoor air
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X11A of outdoor PC board (A1P).
NO
Connect the connector and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R1T) from the outdoor unit PC board. (3.5kΩ to 360kΩ)
NO
Replace the thermistor (R1T).
YES
Replace outdoor unit PC board (A1P).
(V3070)

∗ Refer to "Thermistor Resistance / Temperature Characteristics" table on page 251.

3.26 "J3" Outdoor Unit: Malfunction of Discharge Pipe Thermistor (R2T)

Remote Control Display

J3

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Malfunction is detected from the temperature detected by discharge pipe temperature thermistor.

Malfunction Decision Conditions

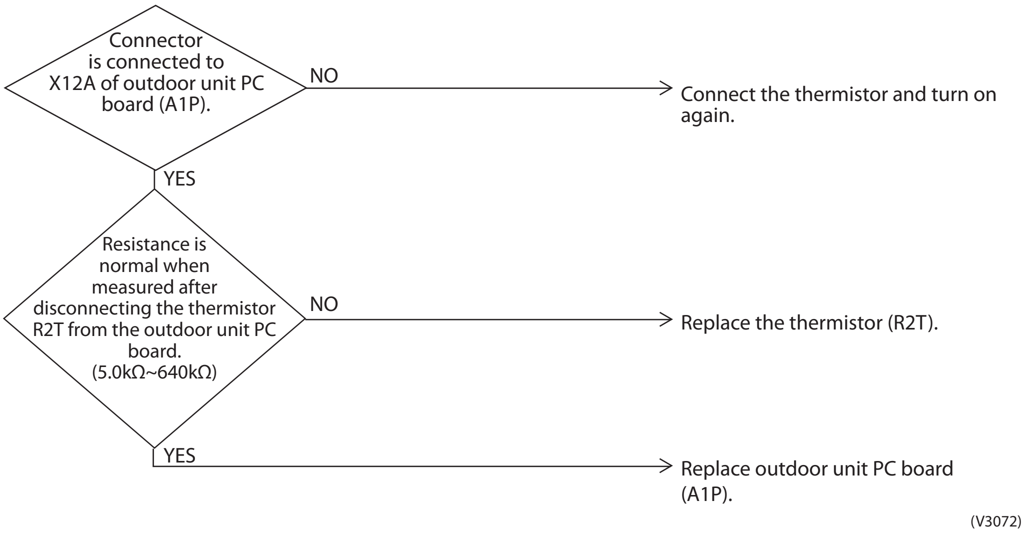
When a short circuit or an open circuit in the discharge pipe temperature thermistor is detected.

Supposed Causes

- Defect of thermistor (R2T) for outdoor unit discharge pipe
- Defect of outdoor unit PC board (A1P)

Troubleshooting

⚠ Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X12A of outdoor unit PC board (A1P).
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor R2T from the outdoor unit PC board. (5.0kΩ~640kΩ)
NO
Replace the thermistor (R2T).
YES
Replace outdoor unit PC board (A1P).
(V3072)

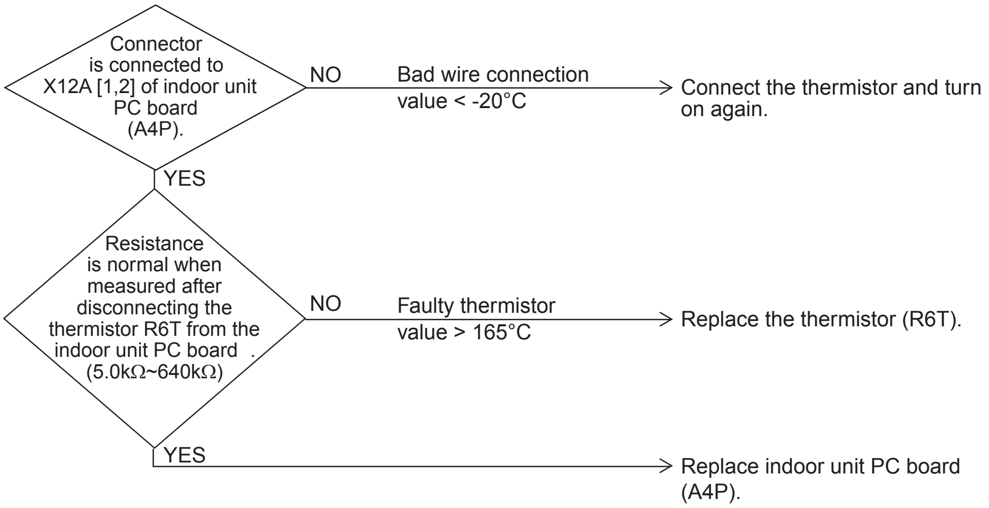
∗ Refer to thermistor resistance / temperature characteristics table on P252.

3.27 "J3" Indoor Unit: Malfunction of Discharge Pipe Thermistor (R6T)

Remote Control Display	J3 Subcode 46
Applicable Models	All indoor units
Method of Malfunction Detection	Malfunction is detected from the temperature detected by discharge pipe temperature thermistor.
Malfunction Decision Conditions	When a short circuit or an open circuit in the discharge pipe temperature thermistor is detected.
Supposed Causes	■ Defect of thermistor (R6T) for indoor unit discharge pipe ■ Defect of indoor unit PC board (A4P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Connector is connected to X12A [1,2] of indoor unit PC board (A4P).
NO
Bad wire connection
value < -20°C
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor R6T from the indoor unit PC board . (5.0kΩ~640kΩ)
NO
Faulty thermistor
value > 165°C
Replace the thermistor (R6T).
YES
Replace indoor unit PC board (A4P).

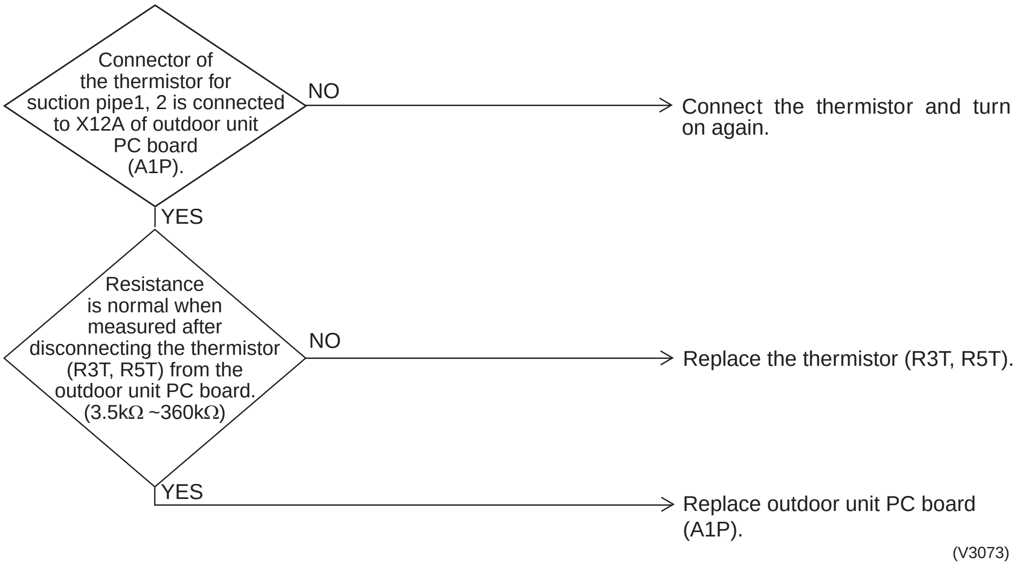
∗ Refer to thermistor resistance / temperature characteristics table on P252.

3.28 "J5" Outdoor Unit: Malfunction of Thermistor (R3T, R5T) for Suction Pipe 1, 2

Remote Control Display	J5
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Malfunction is detected from the temperature detected by the thermistor for suction pipe 1, 2.
Malfunction Decision Conditions	When a short circuit or an open circuit in the thermistor for suction pipe 1, 2 are detected.
Supposed Causes	■ Defect of thermistor (R3T, R5T) for outdoor unit suction pipe ■ Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Connector of the thermistor for suction pipe1, 2 is connected to X12A of outdoor unit PC board (A1P).
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R3T, R5T) from the outdoor unit PC board. (3.5kΩ ~360kΩ)
NO
Replace the thermistor (R3T, R5T).
YES
Replace outdoor unit PC board (A1P).

(V3073)

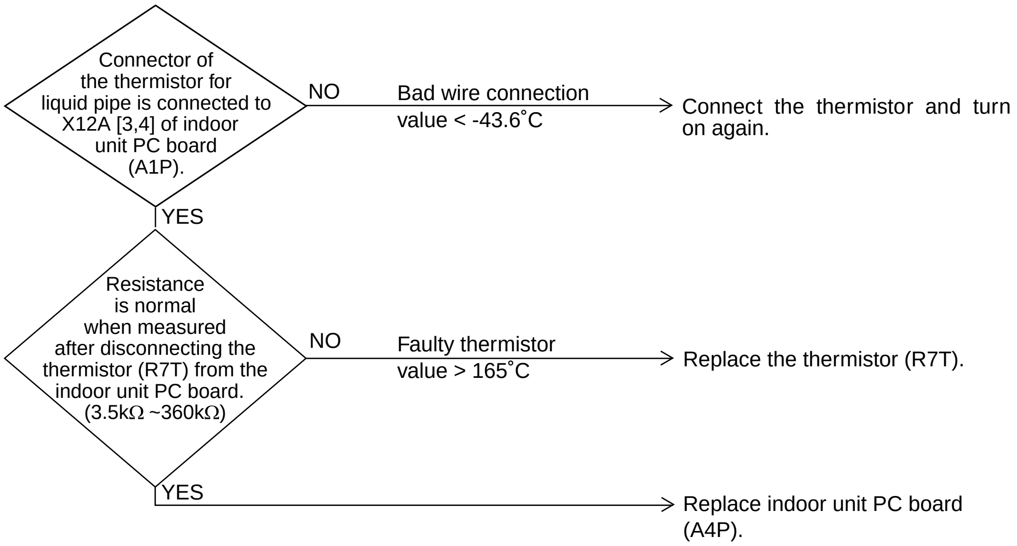
∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.29 "J5" Indoor Unit: Malfunction of Thermistor (R7T) for Liquid R-134a

Remote Control Display	J5 Subcode 11
Applicable Models	All indoor units
Method of Malfunction Detection	Malfunction is detected from the temperature detected by the thermistor for liquid pipe.
Malfunction Decision Conditions	When a short circuit or an open circuit in the thermistor for liquid pipe are detected.
Supposed Causes	■ Defect of thermistor (R7T) for liquid R134a ■ Defect of indoor unit PC board (A4P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Connector of the thermistor for liquid pipe is connected to X12A [3,4] of indoor unit PC board (A1P).
NO
Bad wire connection
value < -43.6˚C
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R7T) from the indoor unit PC board. (3.5kΩ ~360kΩ)
NO
Faulty thermistor
value > 165˚C
Replace the thermistor (R7T).
YES
Replace indoor unit PC board (A4P).

∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.30 "J6" Outdoor Unit: Malfunction of Thermistor (R6T) for Outdoor Unit Heat Exchanger

Remote Control Display

J6

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Malfunction is detected from the temperature detected by the heat exchanger thermistor.

Malfunction Decision Conditions

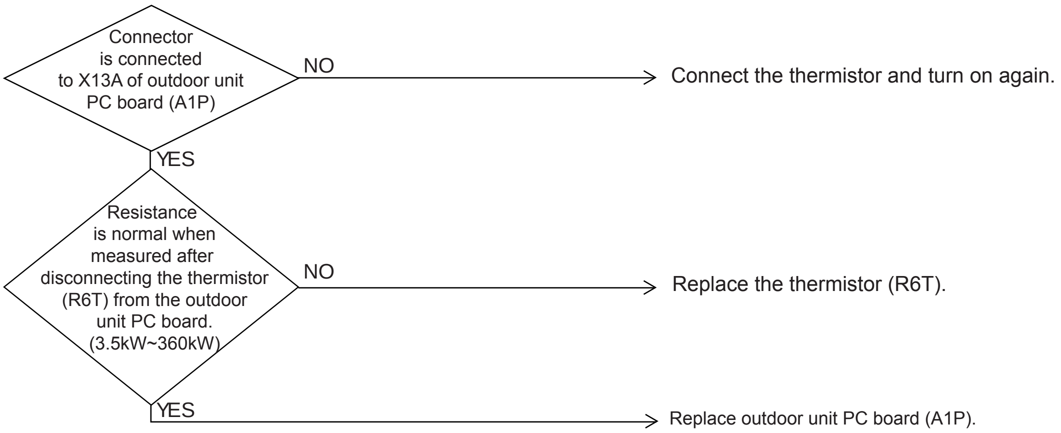
When a short circuit or an open circuit in the heat exchange thermistor is detected.

Supposed Causes

- Defect of thermistor (R6T triphase) (R4T monophase) for outdoor unit heat exchanger
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Connector is connected to X13A of outdoor unit PC board (A1P)
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R6T) from the outdoor unit PC board. (3.5kW~360kW)
NO
Replace the thermistor (R6T).
YES
Replace outdoor unit PC board (A1P).

∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.31 "J7" Outdoor Unit: Malfunction of Thermistor (R7T) for Outdoor Unit Liquid Pipe

Remote Control Display

J7

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Malfunction is detected from the temperature detected by the liquid pipe thermistor.

Malfunction Decision Conditions

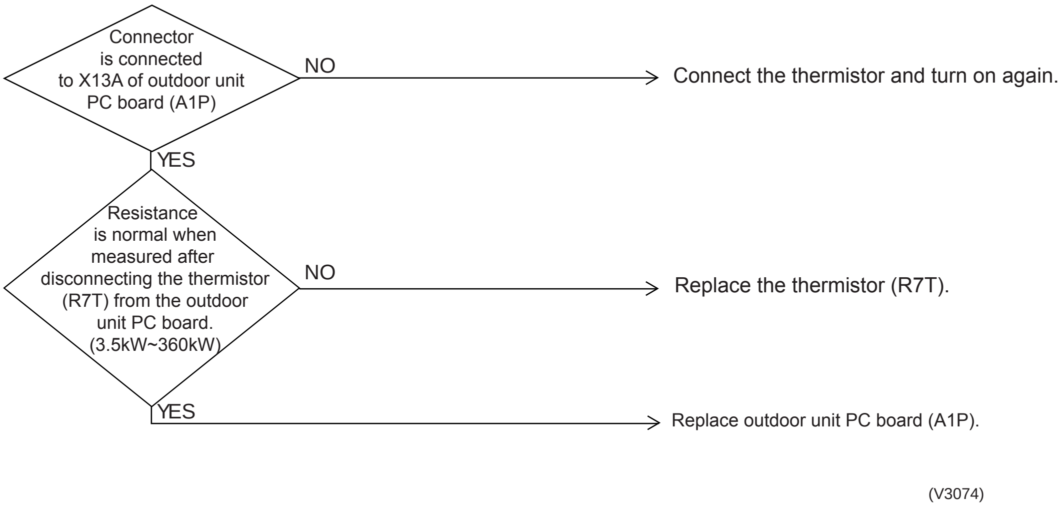
When a short circuit or an open circuit in the heat exchange thermistor is detected.

Supposed Causes

- Defect of thermistor (R7T) for outdoor unit liquid pipe
- Defect of outdoor unit PC board (A1P)

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Connector is connected to X13A of outdoor unit PC board (A1P)
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R7T) from the outdoor unit PC board. (3.5kW~360kW)
NO
Replace the thermistor (R7T).
YES
Replace outdoor unit PC board (A1P).
(V3074)

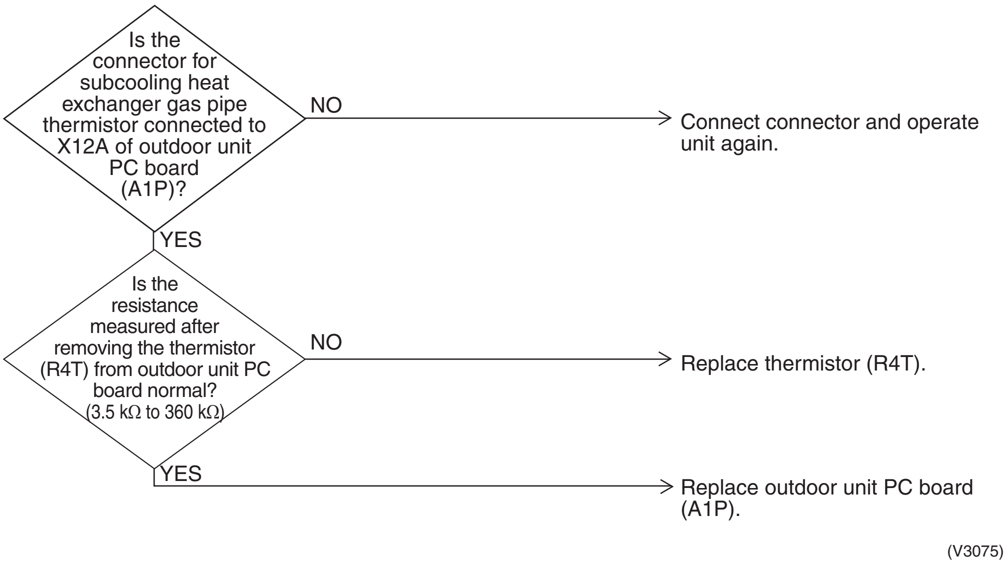
∗ Refer to thermistor resistance / temperature characteristics table on P251.

3.32 "J9" Outdoor Unit: Malfunction of Thermistor (R4T) for Subcooling Heat Exchanger Gas Pipe

Remote Control Display	J9
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Malfunction is detected according to the temperature detected by subcooling heat exchanger gas pipe thermistor.
Malfunction Decision Conditions	When the subcooling heat exchanger gas pipe thermistor is short circuited or open.
Supposed Causes	■ Faulty subcooling heat exchanger gas pipe thermistor (R4T) ■ Faulty outdoor unit PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the connector for subcooling heat exchanger gas pipe thermistor connected to X12A of outdoor unit PC board (A1P)?
NO
Connect connector and operate unit again.
YES
Is the resistance measured after removing the thermistor (R4T) from outdoor unit PC board normal? (3.5 kΩ to 360 kΩ)
NO
Replace thermistor (R4T).
YES
Replace outdoor unit PC board (A1P).
(V3075)

∗ Refer to "Thermistor Resistance / Temperature Characteristics" table on P251.

3.33 "JA" Outdoor Unit: Malfunction of High Pressure Sensor

Remote Control Display

JA

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Malfunction is detected from the pressure detected by the high pressure sensor.

Malfunction Decision Conditions

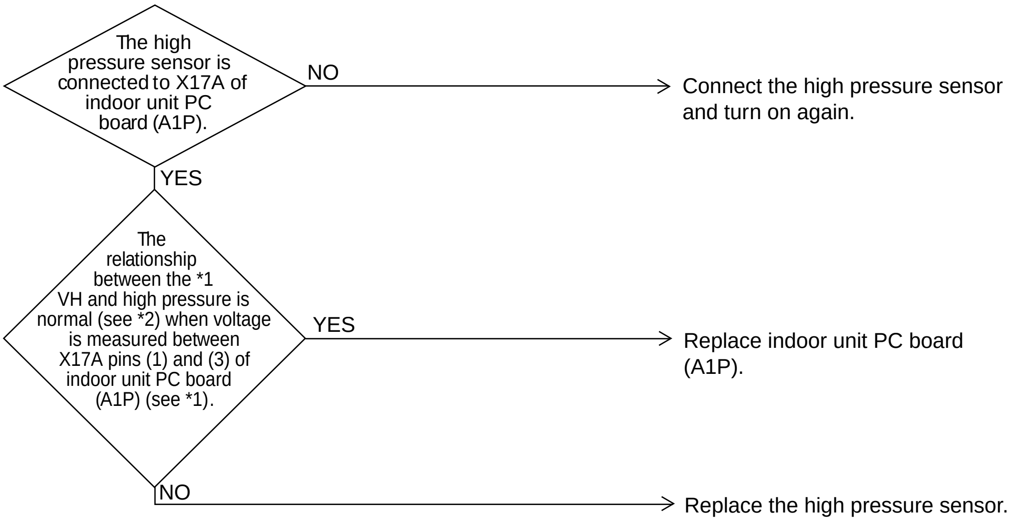
When the high pressure sensor is short circuit or open circuit.

Supposed Causes

- Defect of high pressure sensor
- Connection of low pressure sensor with wrong connection
- Defect of outdoor unit PC board

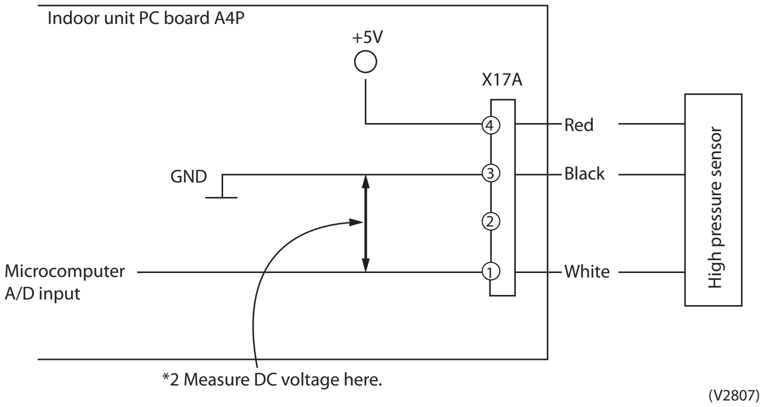
Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


The high pressure sensor is connected to X17A of indoor unit PC board (A1P).
NO
Connect the high pressure sensor and turn on again.
YES
The relationship between the *1 VH and high pressure is normal (see *2) when voltage is measured between X17A pins (1) and (3) of indoor unit PC board (A1P) (see *1).
YES
Replace indoor unit PC board (A1P).
NO
Replace the high pressure sensor.

(V2806)

*1: Voltage measurement point



(V2807)

*2: Refer to "Pressure Sensor", pressure / voltage characteristics table on P254.

3.34 "JA" Indoor Unit: Malfunction of High Pressure Sensor

Remote Control Display

JA

Subcode 16

Applicable Models

All indoor units

Method of Malfunction Detection

Malfunction is detected from the pressure detected by the high pressure sensor.

Malfunction Decision Conditions

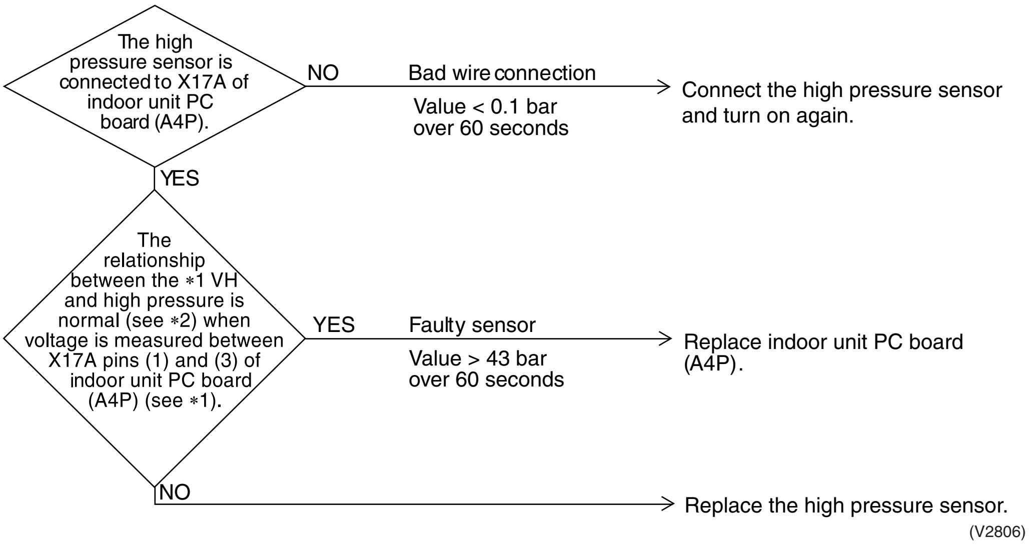
When the high pressure sensor is short circuit or open circuit.

Supposed Causes

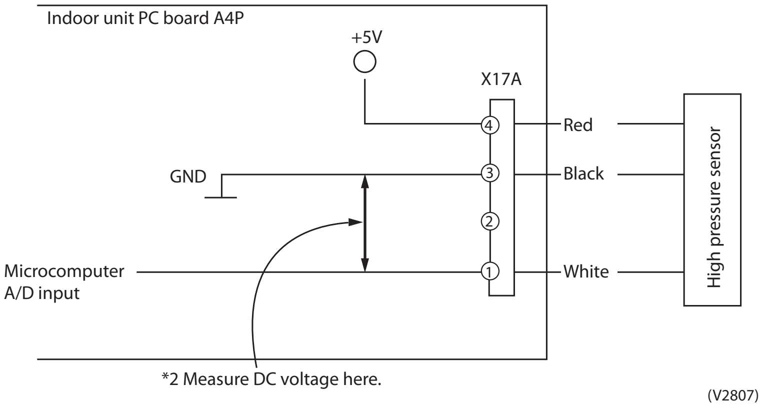
- Defect of high pressure sensor
- Connection of low pressure sensor with wrong connection
- Defect of indoor unit PC board (A4P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged


The high pressure sensor is connected to X17A of indoor unit PC board (A4P).
NO
Bad wire connection
Value < 0.1 bar over 60 seconds
Connect the high pressure sensor and turn on again.
YES
The relationship between the ∗1 VH and high pressure is normal (see ∗2) when voltage is measured between X17A pins (1) and (3) of indoor unit PC board (A4P) (see ∗1).
YES
Faulty sensor
Value > 43 bar over 60 seconds
Replace indoor unit PC board (A4P).
NO
Replace the high pressure sensor.
(V2806)

∗1: Voltage measurement point



∗2: Refer to "Pressure Sensor", pressure / voltage characteristics table on P254.

3.35 "JC" Outdoor Unit: Malfunction of Low Pressure Sensor

Remote Control Display

JC

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Malfunction is detected from pressure detected by low pressure sensor.

Malfunction Decision Conditions

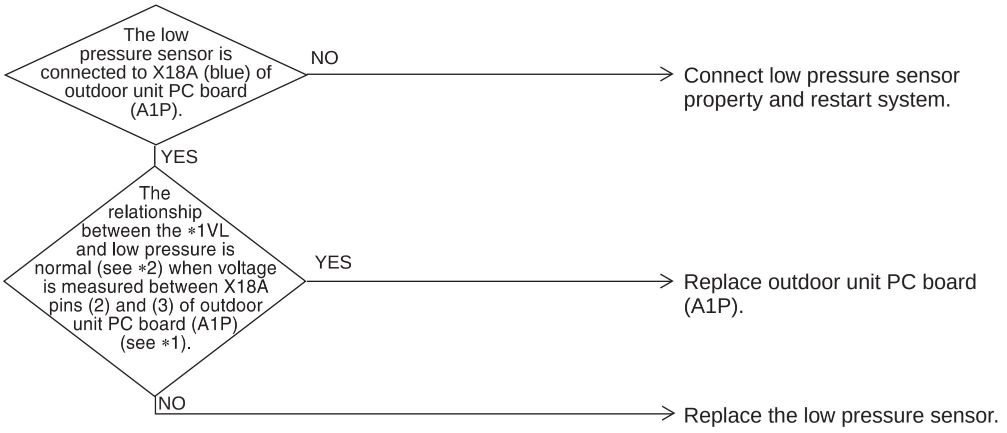
When the low pressure sensor is short circuit or open circuit.

Supposed Causes

- Defect of low pressure sensor
- Connection of high pressure sensor with wrong connection
- Defect of outdoor unit PC board

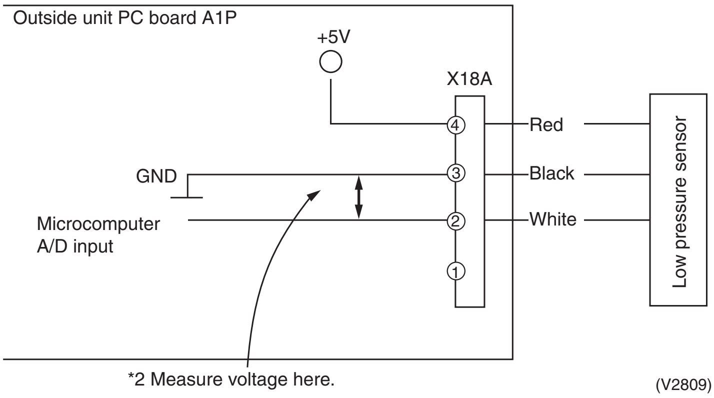
Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


The low pressure sensor is connected to X18A (blue) of outdoor unit PC board (A1P).
NO
Connect low pressure sensor property and restart system.
YES
The relationship between the ∗1VL and low pressure is normal (see ∗2) when voltage is measured between X18A pins (2) and (3) of outdoor unit PC board (A1P) (see ∗1).
YES
Replace outdoor unit PC board (A1P).
NO
Replace the low pressure sensor.

(V2808)

∗1: Voltage measurement point



(V2809)

∗2: Refer to "Pressure Sensor", pressure/voltage characteristics table on P254.

3.36 "JC" Indoor Unit: Malfunction of Low Pressure Sensor

Remote Control Display

JC

Subcode 16

Applicable Models

All indoor units

Method of Malfunction Detection

Malfunction is detected from pressure detected by low pressure sensor.

Malfunction Decision Conditions

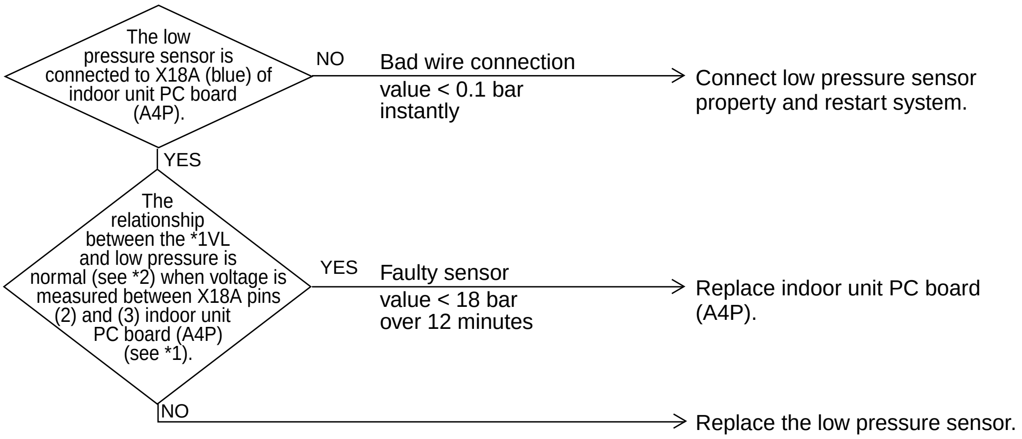
When the low pressure sensor is short circuit or open circuit.

Supposed Causes

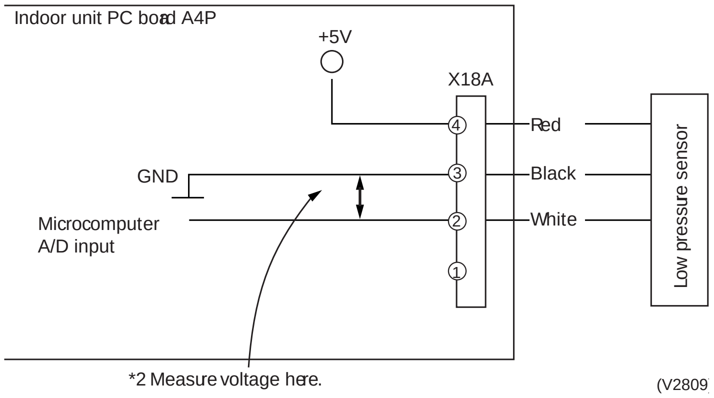
- Defect of low pressure sensor
- Connection of high pressure sensor with wrong connection
- Defect of indoor unit PC board (A4P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


The low pressure sensor is connected to X18A (blue) of indoor unit PC board (A4P).
NO
Bad wire connection
value < 0.1 bar instantly
Connect low pressure sensor property and restart system.
YES
The relationship between the *1VL and low pressure is normal (see *2) when voltage is measured between X18A pins (2) and (3) indoor unit PC board (A4P) (see *1).
YES
Faulty sensor
value < 18 bar over 12 minutes
Replace indoor unit PC board (A4P).
NO
Replace the low pressure sensor.

∗1: Voltage measurement point



∗2: Refer to "Pressure Sensor", pressure/voltage characteristics table on P254.

3.37 "L1" Outdoor Unit: Malfunction of PC Board

Remote Control Display

L1

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

- Detect malfunctions by current value during waveform output before compressor startup.
- Detect malfunctions by current sensor value during synchronized operation at the time of startup.

Malfunction Decision Conditions

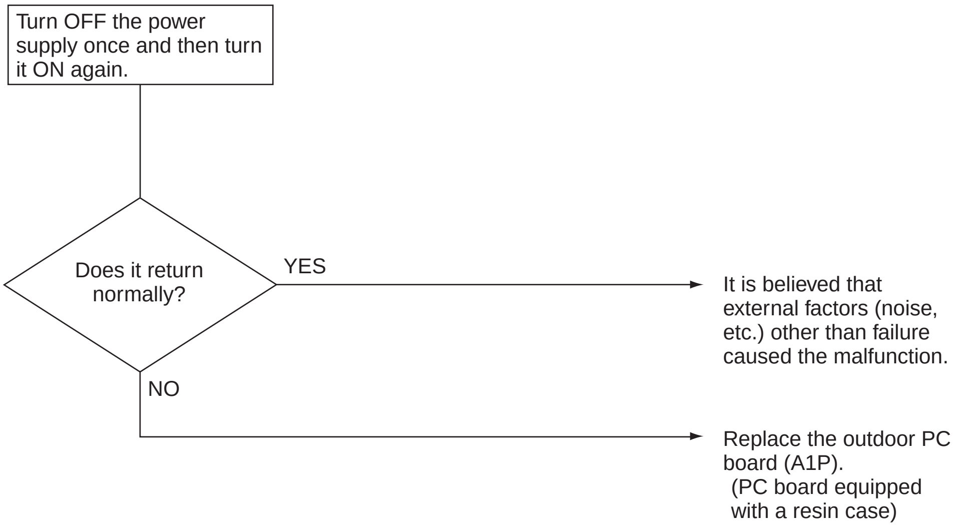
- In case of overcurrent (OCP) during waveform output
- When the current sensor malfunctions during synchronized operation
- In case of IGBT malfunction

Supposed Causes

- Faulty outdoor PC board (A1P)
  - Over current
  - Current sensor failure
  - Failure of IGBT or drive circuit

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Turn OFF the power supply once and then turn it ON again.
Does it return normally?
YES
It is believed that external factors (noise, etc.) other than failure caused the malfunction.
NO
Replace the outdoor PC board (A1P). (PC board equipped with a resin case)

3.38 "L1" Indoor Unit: Malfunction of PC Board

Remote Control Display

L1

Subcode 30

Applicable Models

All indoor units

Method of Malfunction Detection

- ■ Detect malfunctions by current value during waveform output before compressor startup.
- ■ Detect malfunctions by current sensor value during synchronized operation at the time of startup.

Malfunction Decision Conditions

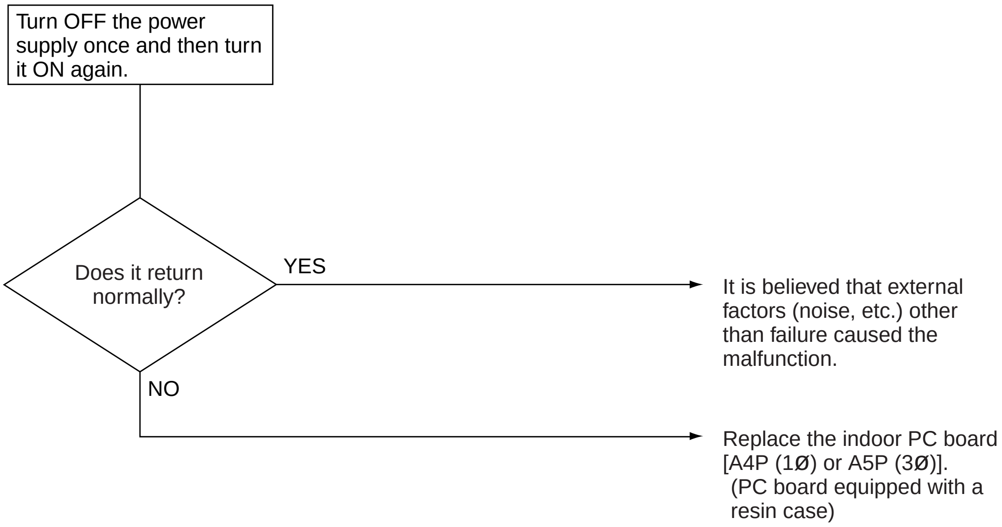
- ■ In case of overcurrent (OCP) during waveform output
- ■ When the current sensor malfunctions during synchronized operation
- ■ In case of IGBT malfunction

Supposed Causes

- ■ Faulty indoor PC board [A4P (1Ø) or A5P (3Ø)]
  - Over current
  - Current sensor failure
  - Failure of IGBT or drive circuit

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

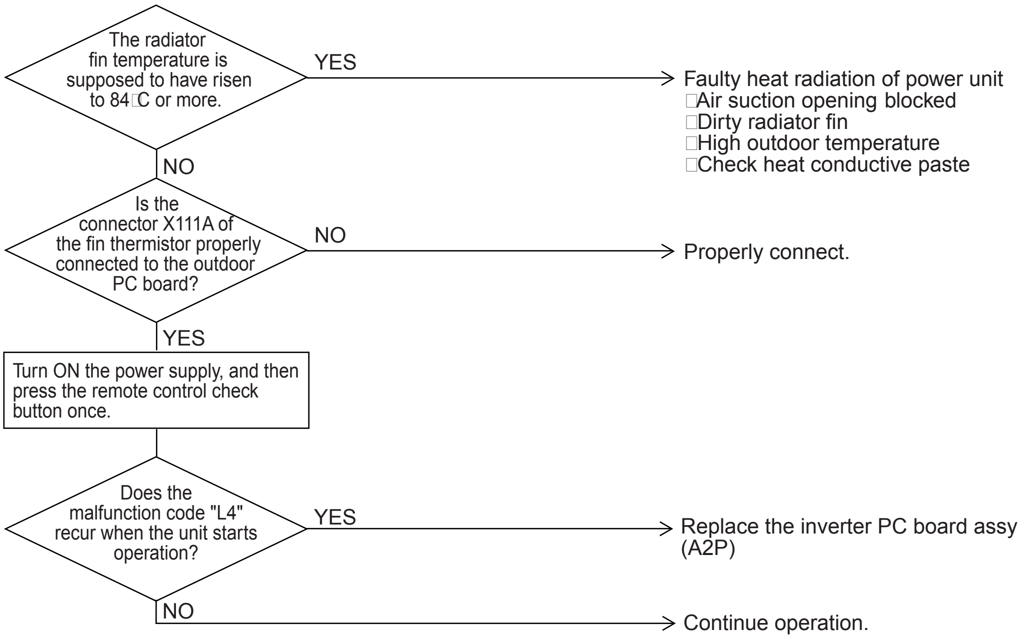

Turn OFF the power supply once and then turn it ON again.
Does it return normally?
YES
It is believed that external factors (noise, etc.) other than failure caused the malfunction.
NO
Replace the indoor PC board [A4P (1Ø) or A5P (3Ø)]. (PC board equipped with a resin case)

3.39 "L4" Outdoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise

Remote Control Display	L4
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Fin temperature is detected by the thermistor of the radiation fin.
Malfunction Decision Conditions	When the temperature of the inverter radiation fin increases above 83°C.
Supposed Causes	■ Actuation of fin thermal (Actuates above 83°C) ■ Defect of inverter PC board (A2P) ■ Defect of fin thermistor

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.

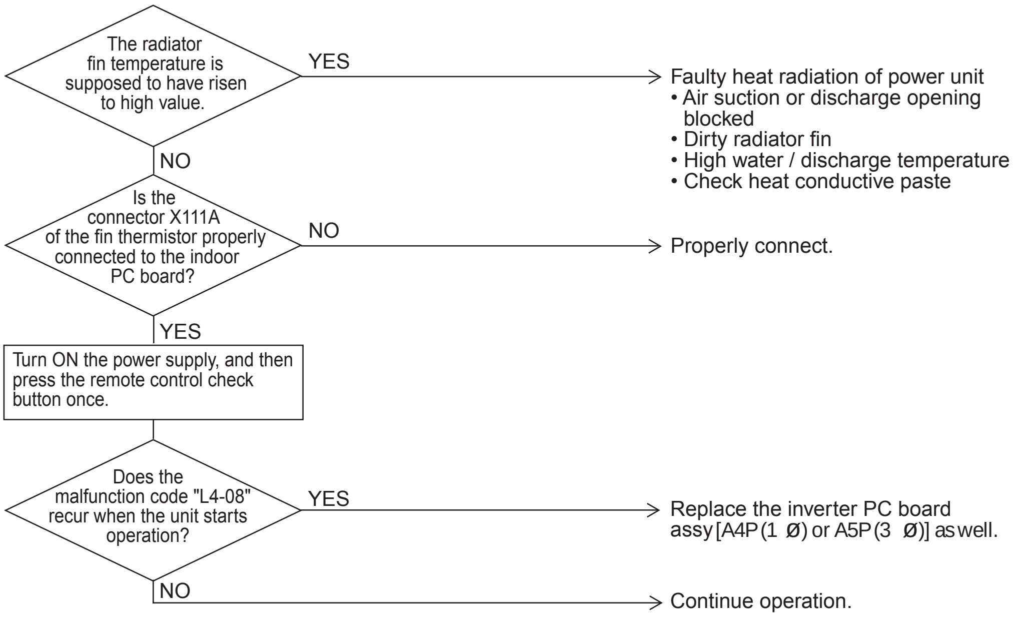

The radiator fin temperature is supposed to have risen to 84°C or more.
YES
Faulty heat radiation of power unit
Air suction opening blocked
Dirty radiator fin
High outdoor temperature
Check heat conductive paste
NO
Is the connector X111A of the fin thermistor properly connected to the outdoor PC board?
NO
Properly connect.
YES
Turn ON the power supply, and then press the remote control check button once.
Does the malfunction code "L4" recur when the unit starts operation?
YES
Replace the inverter PC board assy (A2P)
NO
Continue operation.

3.40 "L4" Indoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise (R8T)

Remote Control Display	L4 Subcode 8
Applicable Models	All indoor units
Method of Malfunction Detection	Fin temperature is detected by the thermistor of the radiation fin. If fin temperature is too high, the compressor will slow down (capacity shortage).
Malfunction Decision Conditions	Faulty thermistor. Broken wire.
Supposed Causes	■ Defect of inverter PC board [A4P (1Ø) or A5P (3Ø)] ■ Defect of fin thermistor (R8T)

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


The radiator fin temperature is supposed to have risen to high value.
YES
Faulty heat radiation of power unit
• Air suction or discharge opening blocked
• Dirty radiator fin
• High water / discharge temperature
• Check heat conductive paste
NO
Is the connector X111A of the fin thermistor properly connected to the indoor PC board?
NO
Properly connect.
YES
Turn ON the power supply, and then press the remote control check button once.
Does the malfunction code "L4-08" recur when the unit starts operation?
YES
Replace the inverter PC board assy [A4P (1 Ø) or A5P (3 Ø)] as well.
NO
Continue operation.

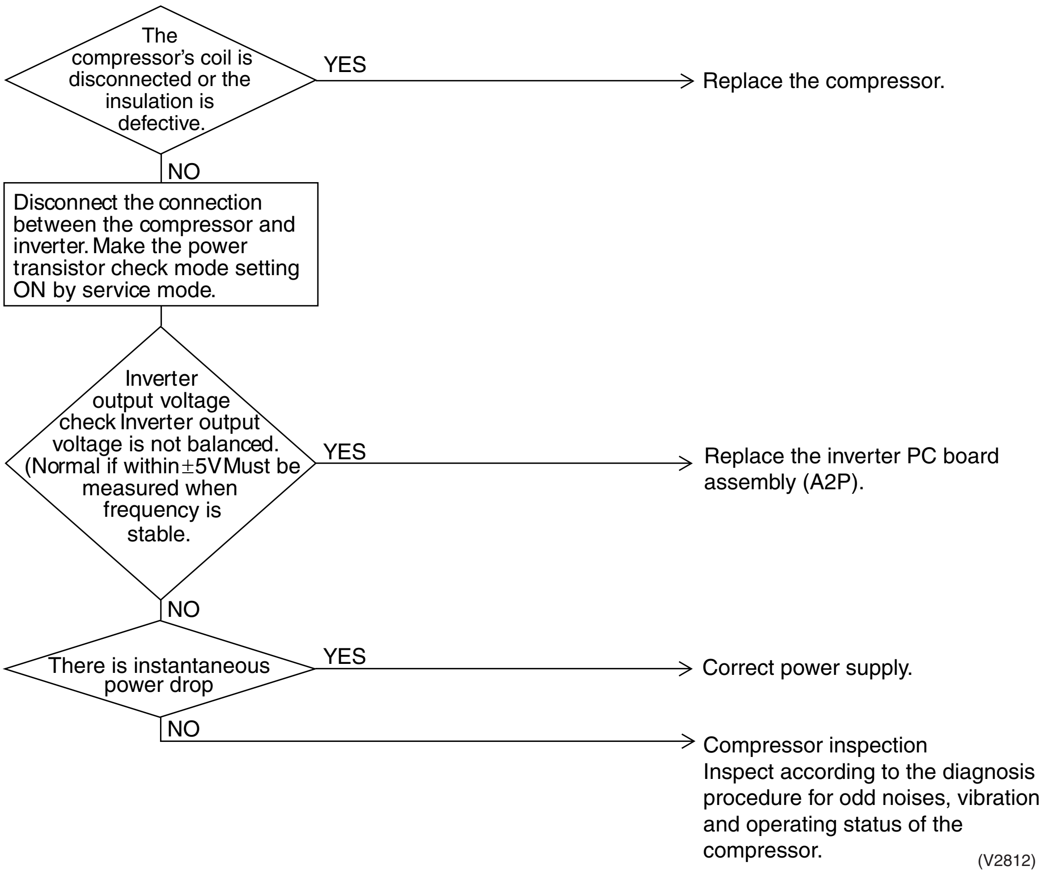
3.41 "L5" Outdoor Unit: Inverter Compressor Abnormal - R-410A

Remote Control Display	L5
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Malfunction is detected from current flowing in the power transistor.
Malfunction Decision Conditions	When an excessive current flows in the power transistor. (Instantaneous overcurrent also causes activation.)
Supposed Causes	■ Defect of compressor coil (disconnected, defective insulation) ■ Compressor start-up malfunction (mechanical lock) ■ Defect of inverter PC board (A2P) ■ Overcurrent

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Compressor inspection


The compressor's coil is disconnected or the insulation is defective.
YES
Replace the compressor.
NO
Disconnect the connection between the compressor and inverter. Make the power transistor check mode setting ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced. (Normal if within±5V Must be measured when frequency is stable.
YES
Replace the inverter PC board assembly (A2P).
NO
There is instantaneous power drop
YES
Correct power supply.
NO
Compressor inspection Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.
(V2812)

Higher voltage than actual is displayed when the inverter output voltage is checked by tester.

3.42 "L5" Indoor Unit: Inverter Compressor Abnormal - R-134a

Remote Control Display

L5

Subcode 13

Applicable Models

All indoor units

Method of Malfunction Detection

Malfunction is detected from current flowing in the power transistor.

Malfunction Decision Conditions

When an excessive current flows in the power transistor.
(Instantaneous overcurrent also causes activation.)

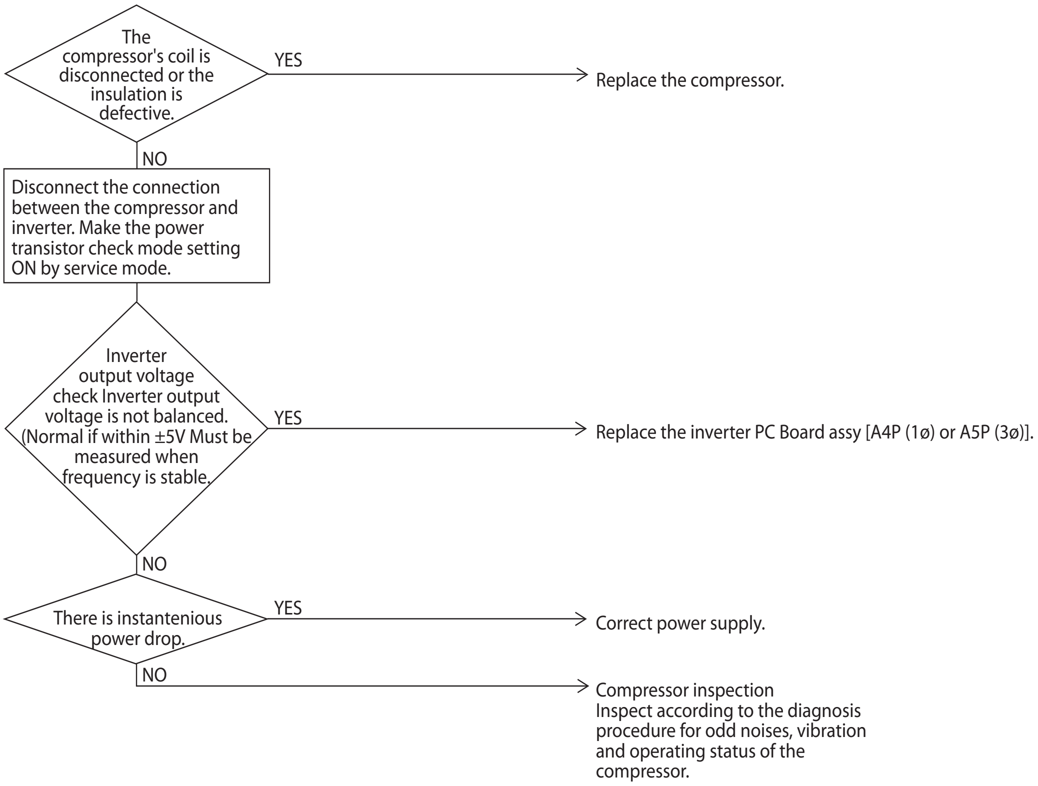
Supposed Causes

- Overcurrent immediate
- Defect of compressor coil (disconnected, defective insulation)
- Compressor start-up malfunction (mechanical lock)
- Defect of inverter PC board [A4P (1Ø) or A5P (3Ø)]

Troubleshooting

⚠ Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Compressor inspection


The compressor's coil is disconnected or the insulation is defective.
YES
Replace the compressor.
NO
Disconnect the connection between the compressor and inverter. Make the power transistor check mode setting ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced. (Normal if within ±5V Must be measured when frequency is stable.
YES
Replace the inverter PC Board assy [A4P (1ø) or A5P (3ø)].
NO
There is instantenious power drop.
YES
Correct power supply.
NO
Compressor inspection
Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.

Higher voltage than actual is displayed when the inverter output voltage is checked by tester.

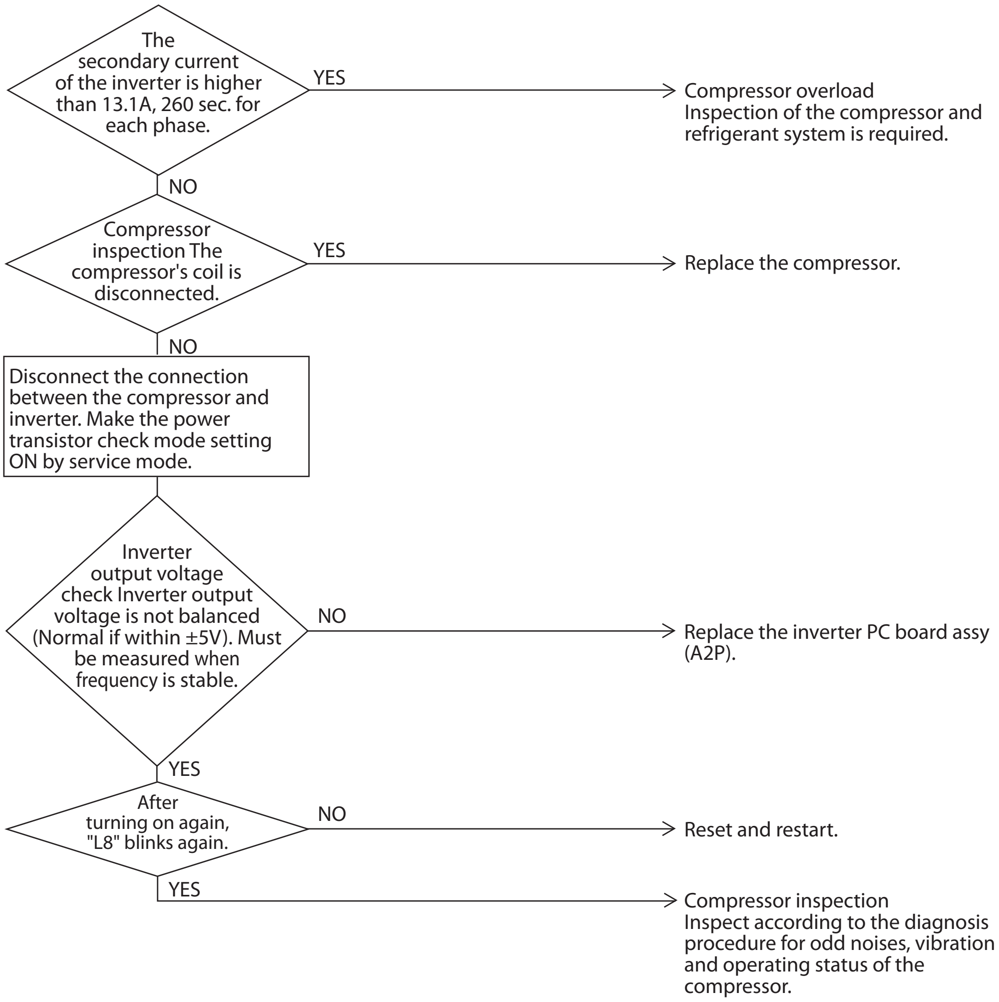
3.43 "L8" Outdoor Unit: Inverter Current Abnormal

Remote Control Display	L8
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Malfunction is detected by current flowing in the power transistor.
Malfunction Decision Conditions	When overload in the compressor is detected.
Supposed Causes	■ Compressor overload ■ Compressor coil disconnected ■ Defect of outdoor unit PC board (A2P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Output current check


The secondary current of the inverter is higher than 13.1A, 260 sec. for each phase.
YES
Compressor overload
Inspection of the compressor and refrigerant system is required.
NO
Compressor inspection The compressor's coil is disconnected.
YES
Replace the compressor.
NO
Disconnect the connection between the compressor and inverter. Make the power transistor check mode setting ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced (Normal if within ±5V). Must be measured when frequency is stable.
NO
Replace the inverter PC board assy (A2P).
YES
After turning on again, "L8" blinks again.
NO
Reset and restart.
YES
Compressor inspection
Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.

(V3184)

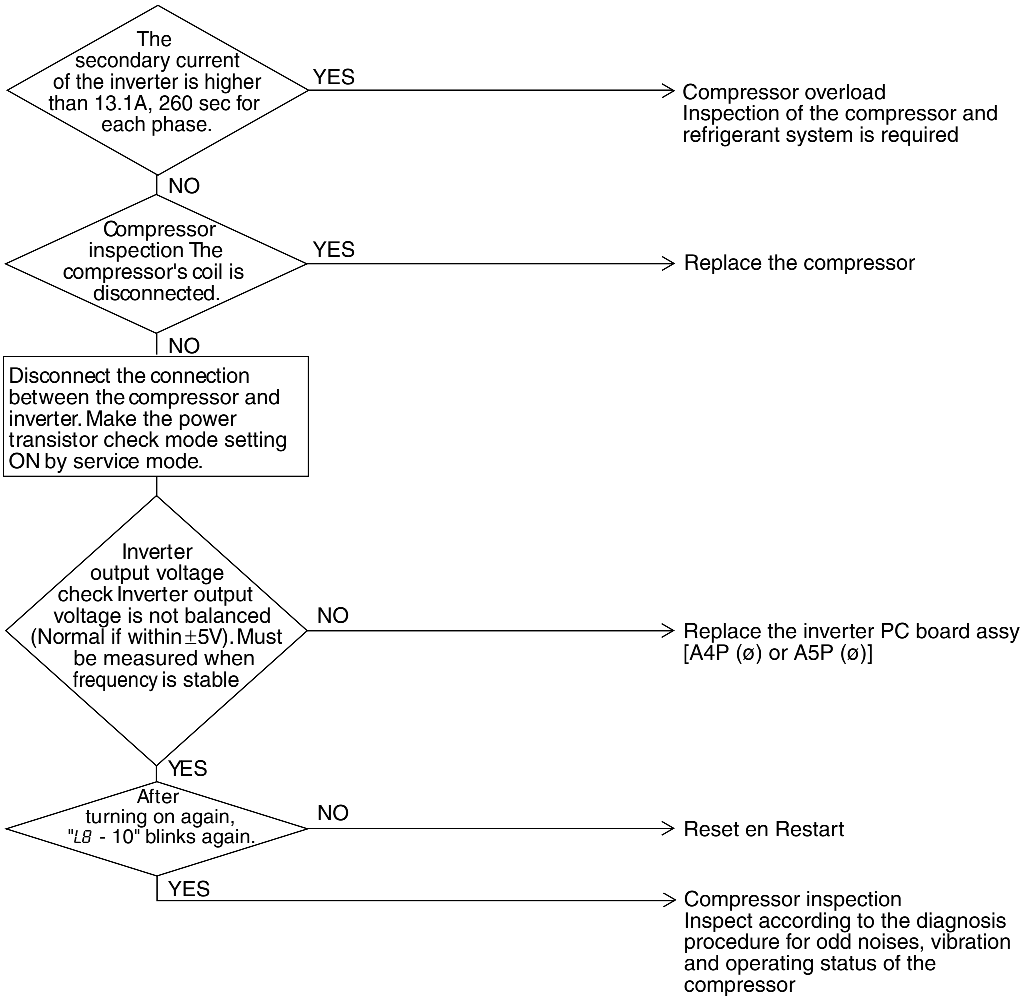
3.44 "L8" Indoor Unit: Inverter Current Abnormal

Remote Control Display	L8 Subcode 10
Applicable Models	All indoor units
Method of Malfunction Detection	Malfunction is detected by current flowing in the power transistor.
Malfunction Decision Conditions	When overload in the compressor is detected.
Supposed Causes	■ Compressor overload ■ Compressor coil disconnected ■ Defect of indoor unit PC board [A4P (1Ø) or A5P (3Ø)] ■ Current protection (thermal)

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Output current check

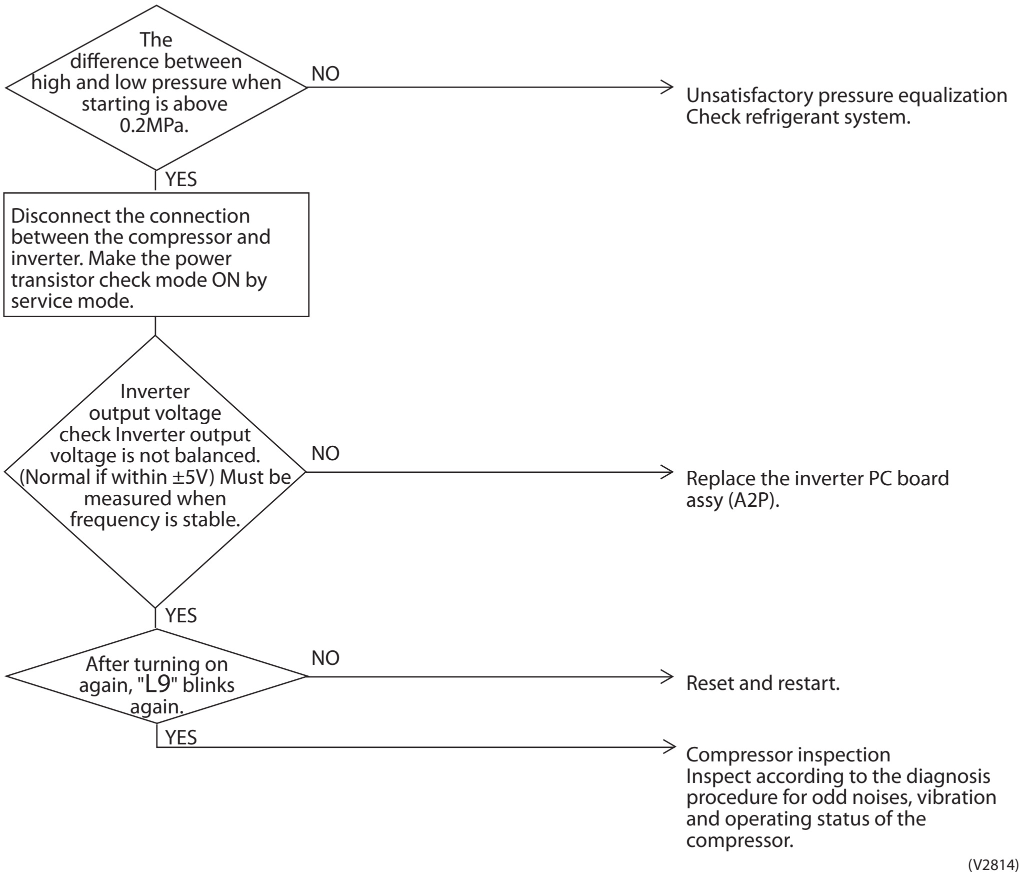

The secondary current of the inverter is higher than 13.1A, 260 sec for each phase.
YES
Compressor overload Inspection of the compressor and refrigerant system is required
NO
Compressor inspection The compressor's coil is disconnected.
YES
Replace the compressor
NO
Disconnect the connection between the compressor and inverter. Make the power transistor check mode setting ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced (Normal if within ±5V). Must be measured when frequency is stable
NO
Replace the inverter PC board assy [A4P (ø) or A5P (ø)]
YES
After turning on again, "L8 - 10" blinks again.
NO
Reset en Restart
YES
Compressor inspection Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor

3.45 "L9" Outdoor Unit: Inverter Start up Error

Remote Control Display	L9
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Malfunction is detected from current flowing in the power transistor.
Malfunction Decision Conditions	When overload in the compressor is detected during startup
Supposed Causes	■ Defect of compressor ■ Pressure differential start ■ Defect of outdoor unit PC board (A2P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The difference between high and low pressure when starting is above 0.2MPa.
NO
Unsatisfactory pressure equalization Check refrigerant system.
YES
Disconnect the connection between the compressor and inverter. Make the power transistor check mode ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced. (Normal if within ±5V) Must be measured when frequency is stable.
NO
Replace the inverter PC board assy (A2P).
YES
After turning on again, "L9" blinks again.
NO
Reset and restart.
YES
Compressor inspection Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.
(V2814)

3.46 "L9" Indoor Unit: Inverter Start up Error

Remote Control Display

L9

Subcode 9

Applicable Models

All indoor units

Method of Malfunction Detection

Malfunction is detected from current flowing in the power transistor.

Malfunction Decision Conditions

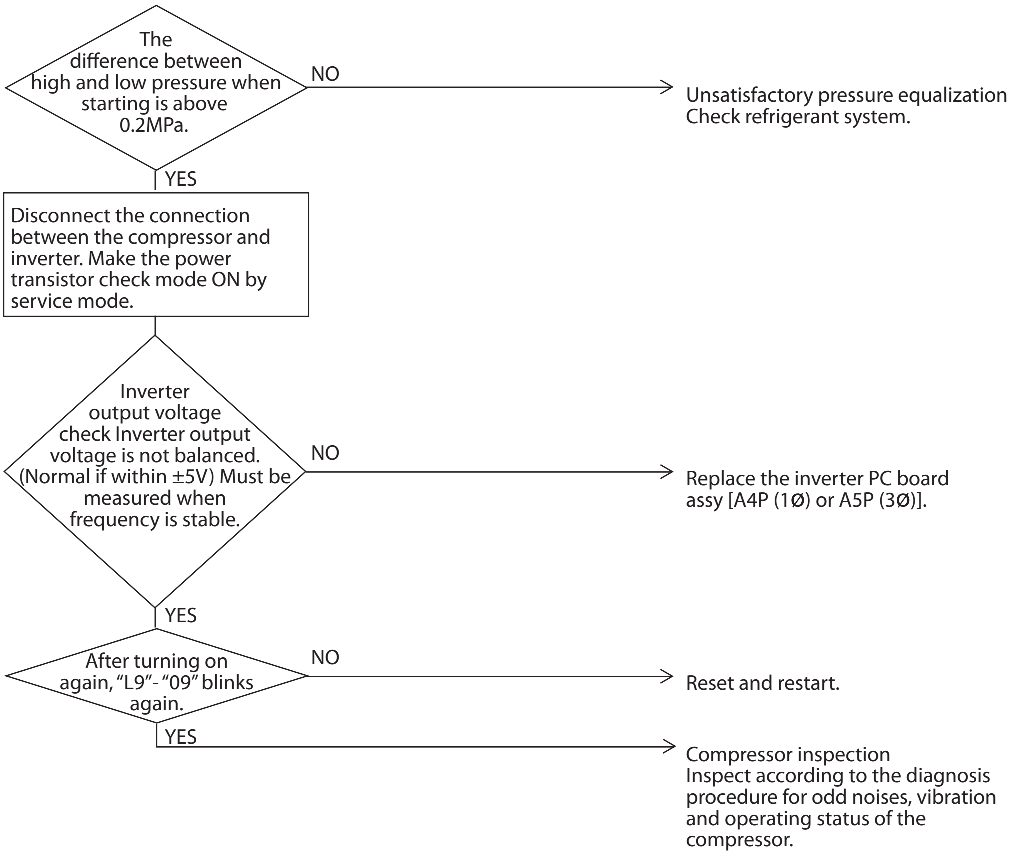
When overload in the compressor is detected during startup

Supposed Causes

- Defect of compressor
- Pressure differential start
- Defect of outdoor unit PC board [A4P (1Ø) or A5P (3Ø)]

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The difference between high and low pressure when starting is above 0.2MPa.
NO
Unsatisfactory pressure equalization Check refrigerant system.
YES
Disconnect the connection between the compressor and inverter. Make the power transistor check mode ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced. (Normal if within ±5V) Must be measured when frequency is stable.
NO
Replace the inverter PC board assy [A4P (1Ø) or A5P (3Ø)].
YES
After turning on again, "L9"- "09" blinks again.
NO
Reset and restart.
YES
Compressor inspection Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.

3.47 "LC" Outdoor Unit: Malfunction of Transmission between Inverter and Control PC Board

Remote Control Display

LC

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Check the communication state between inverter PC board and control PC board by micro-computer.

Malfunction Decision Conditions

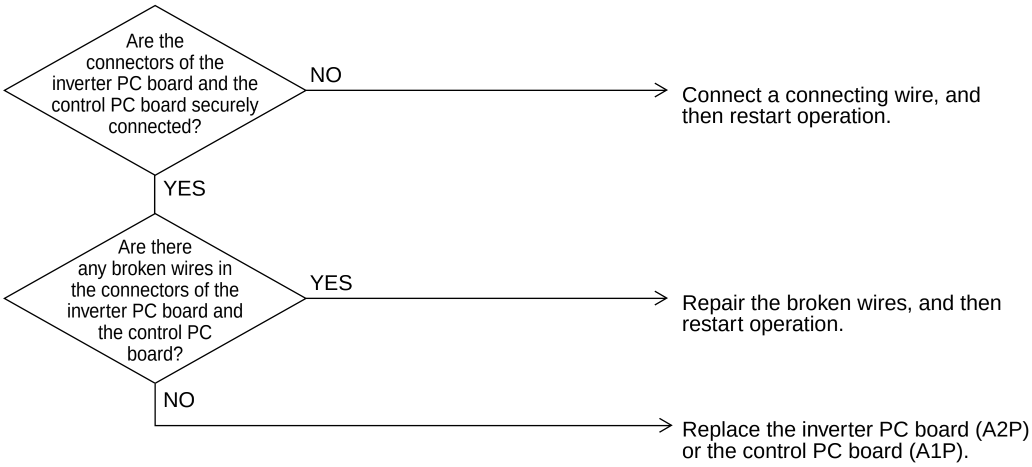
When the correct communication is not conducted in certain period.

Supposed Causes

- Malfunction of connection between the inverter microcomputer and outdoor control microcomputer
- Defect of outdoor unit PC board (A1P) or inverter PC board (A2P).
- External factor (Noise etc.)

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Are the connectors of the inverter PC board and the control PC board securely connected?
NO
Connect a connecting wire, and then restart operation.
YES
Are there any broken wires in the connectors of the inverter PC board and the control PC board?
YES
Repair the broken wires, and then restart operation.
NO
Replace the inverter PC board (A2P) or the control PC board (A1P).

3.48 "LC" Indoor Unit: Malfunction of Transmission between Inverter and Control PC Board

Remote Control Display

LC

Subcode 29

Applicable Models

All indoor units

Method of Malfunction Detection

Check the communication state between inverter PC board and control PC board by micro-computer.

Malfunction Decision Conditions

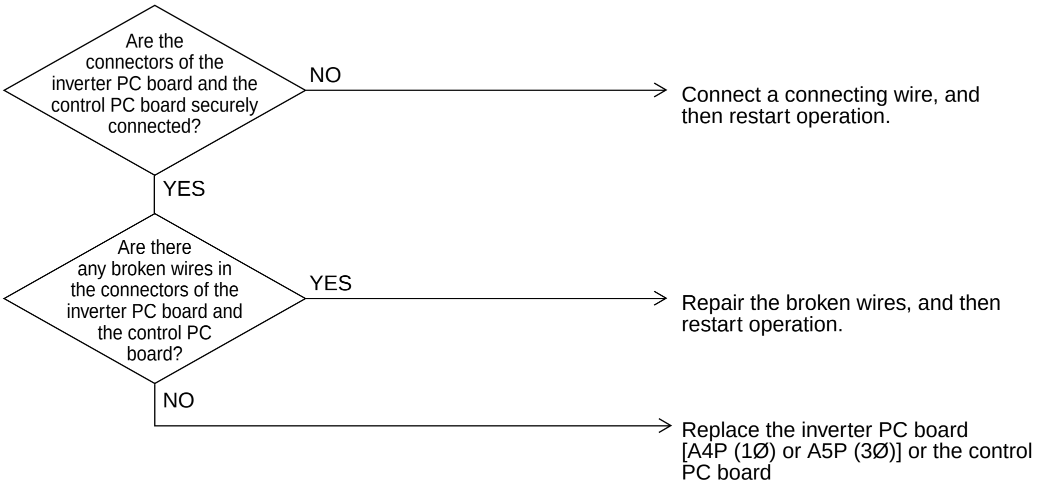
When the correct communication is not conducted in certain period.

Supposed Causes

- Malfunction of connection between the inverter microcomputer and indoor control microcomputer
- Defect of indoor unit PC board [A4P (1Ø) or A5P (3Ø)]
- External factor (Noise etc.)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Are the connectors of the inverter PC board and the control PC board securely connected?
NO
Connect a connecting wire, and then restart operation.
YES
Are there any broken wires in the connectors of the inverter PC board and the control PC board?
YES
Repair the broken wires, and then restart operation.
NO
Replace the inverter PC board [A4P (1Ø) or A5P (3Ø)] or the control PC board

3.49 "LH" Indoor Unit: Converter Error

Remote Control Display	LH Subcode 2
Applicable Models	All indoor units
Method of Malfunction Detection	
Malfunction Decision Conditions	
Supposed Causes	■ Inverter PC board problem
Troubleshooting	⚠**Caution**: Be sure to turn off the power switch before connecting or disconnecting connector, otherwise parts may be damaged. Replace the inverter PC board.

3.50 "P1" Outdoor Unit: High Voltage of Capacitor in Main Inverter Circuit

Remote Control Display

P1

Applicable Models

ER*Q 011~016*

Method of Malfunction Detection

Malfunction is detected according to the voltage waveform of main circuit capacitor built in the inverter.

Malfunction Decision Conditions

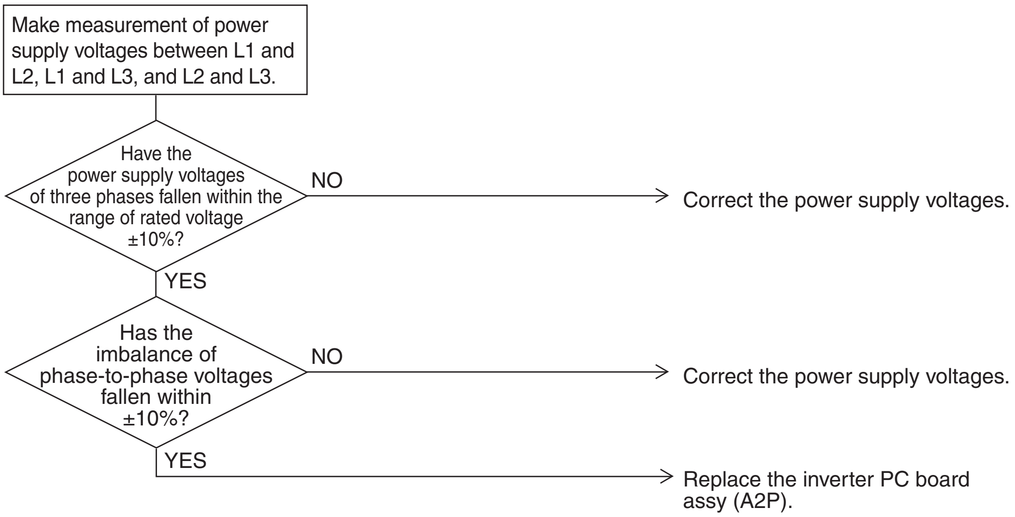
When the aforementioned voltage waveform becomes identical with the waveform of the power supply open phase.

Supposed Causes

- Defect of main circuit capacitor
- Improper main circuit wiring
- Defect of outdoor unit PC board (A2P)
- Imbalance of phase-to-phase voltages
- Open phase

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Make measurement of power supply voltages between L1 and L2, L1 and L3, and L2 and L3.
Have the power supply voltages of three phases fallen within the range of rated voltage ±10%?
NO
Correct the power supply voltages.
YES
Has the imbalance of phase-to-phase voltages fallen within ±10%?
NO
Correct the power supply voltages.
YES
Replace the inverter PC board assy (A2P).

3.51 "P1" Indoor Unit: High Voltage of Capacitor in Main Inverter Circuit

Remote Control Display

P1

Subcode 6

Applicable Models

All indoor units

Method of Malfunction Detection

Malfunction is detected according to the voltage waveform of main circuit capacitor built in the inverter.

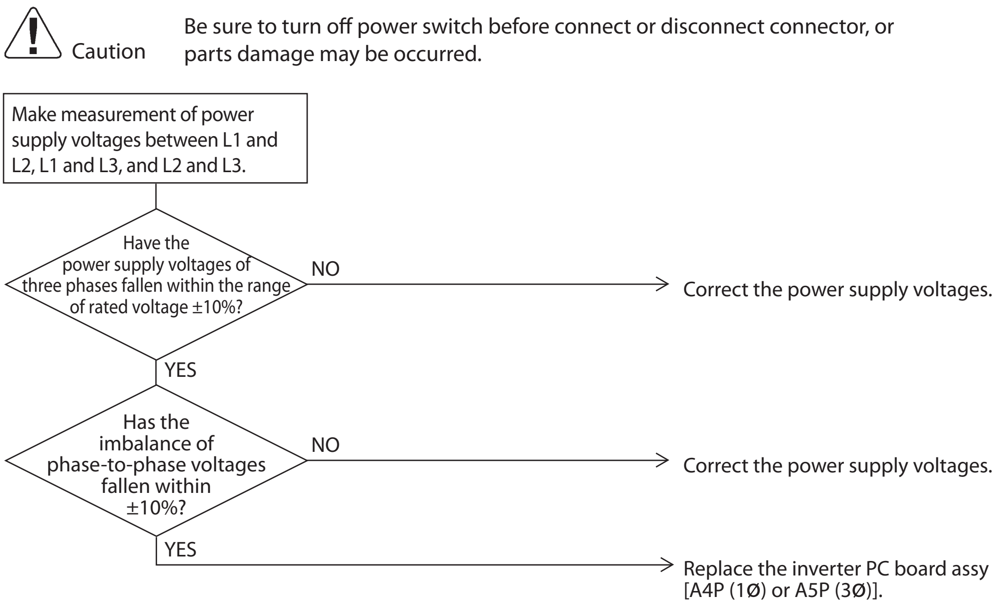
Malfunction Decision Conditions

When the aforementioned voltage waveform becomes identical with the waveform of the power supply open phase.

Supposed Causes

- Defect of main circuit capacitor
- Improper main circuit wiring
- Defect of indoor unit inverter PC board [A4P (1ø) or A5P (3ø)]
- Imbalance of phase-to-phase voltages
- Open phase

Troubleshooting


Caution
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.
Make measurement of power supply voltages between L1 and L2, L1 and L3, and L2 and L3.
Have the power supply voltages of three phases fallen within the range of rated voltage ±10%?
NO
Correct the power supply voltages.
YES
Has the imbalance of phase-to-phase voltages fallen within ±10%?
NO
Correct the power supply voltages.
YES
Replace the inverter PC board assy [A4P (1Ø) or A5P (3Ø)].

3.52 "PJ" Indoor Unit: Faulty Combination of PCB

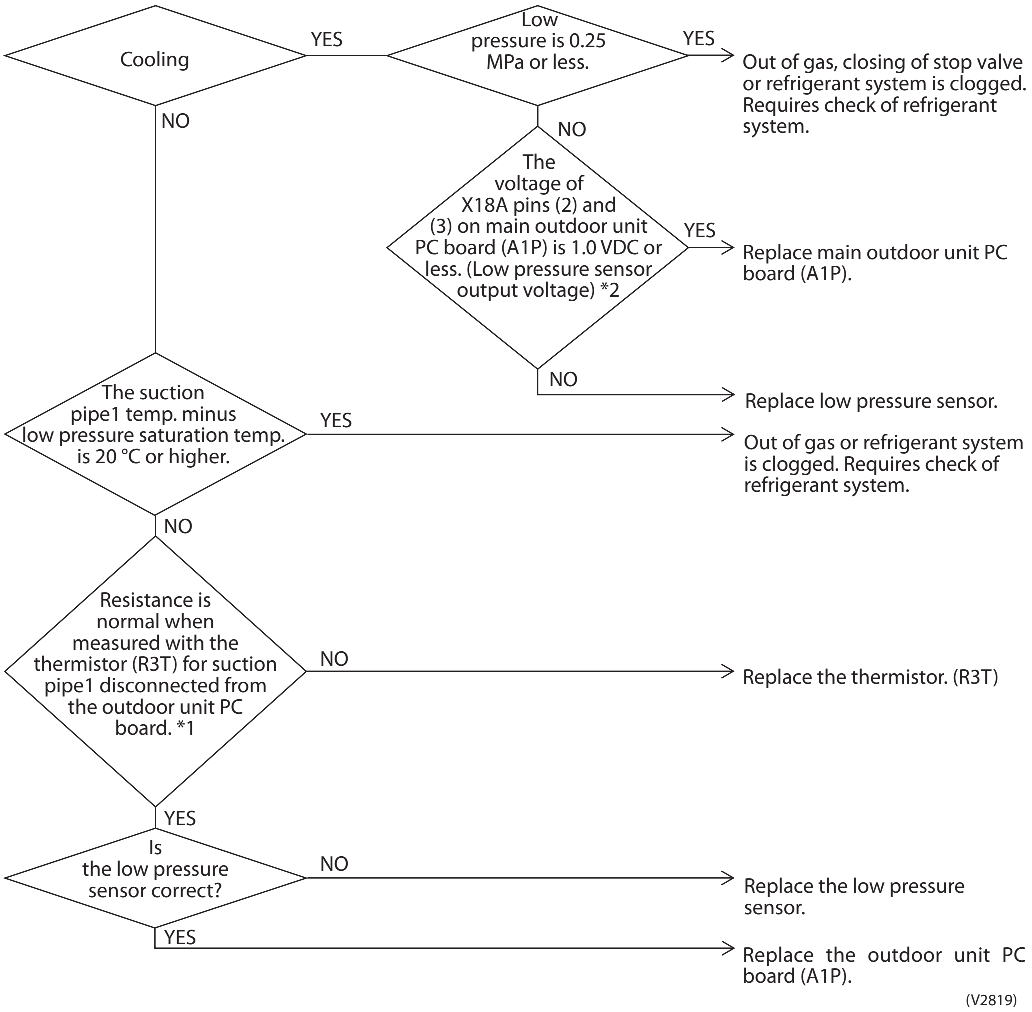
Remote Control Display	PJ Subcode 11
Applicable Models	All indoor units
Method of Malfunction Detection	This malfunction is detected according to communications with the inverter.
Malfunction Decision Conditions	Make judgment according to communication data on whether or not the type of the inverter PCB is correct.
Supposed Causes	■ Mismatching of type of PCB.
Troubleshooting	⚠**Caution**: Be sure to turn off the power switch before connecting or disconnecting connector, otherwise parts may be damaged. Replace the inverter PC board assy [A4P (1ø) or A5P (3ø)].

3.53 "U0" Low Pressure Drop Due to Refrigerant Shortage or Electronic Expansion Valve Failure

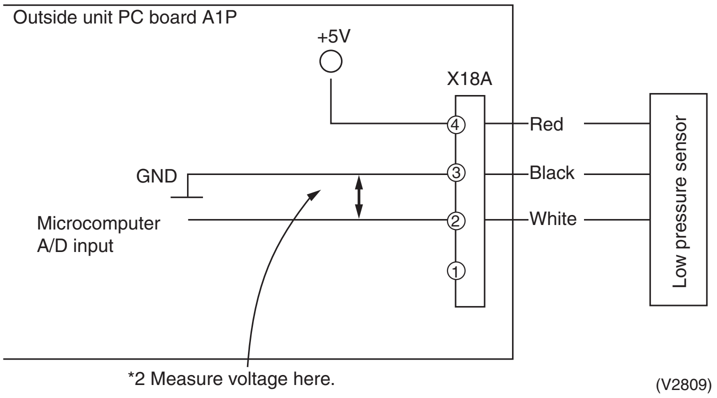
Remote Control Display	U0
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Short of gas malfunction is detected by discharge pipe temperature thermistor and low pressure saturation temperature.
Malfunction Decision Conditions	Microcomputer judge and detect if the system is short of refrigerant. ★Malfunction is not decided while the unit operation is continued.
Supposed Causes	■ Out of gas or refrigerant system clogging (incorrect piping) ■ Defect of pressure sensor ■ Defect of outdoor unit PC board (A1P) ■ Defect of thermistor R3T

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Cooling
YES
Low pressure is 0.25 MPa or less.
YES
Out of gas, closing of stop valve or refrigerant system is clogged. Requires check of refrigerant system.
NO
NO
The voltage of X18A pins (2) and (3) on main outdoor unit PC board (A1P) is 1.0 VDC or less. (Low pressure sensor output voltage) *2
YES
Replace main outdoor unit PC board (A1P).
NO
Replace low pressure sensor.
The suction pipe1 temp. minus low pressure saturation temp. is 20 °C or higher.
YES
Out of gas or refrigerant system is clogged. Requires check of refrigerant system.
NO
Resistance is normal when measured with the thermistor (R3T) for suction pipe1 disconnected from the outdoor unit PC board. *1
NO
Replace the thermistor. (R3T)
YES
Is the low pressure sensor correct?
NO
Replace the low pressure sensor.
YES
Replace the outdoor unit PC board (A1P).
(V2819)

∗2: Voltage measurement point



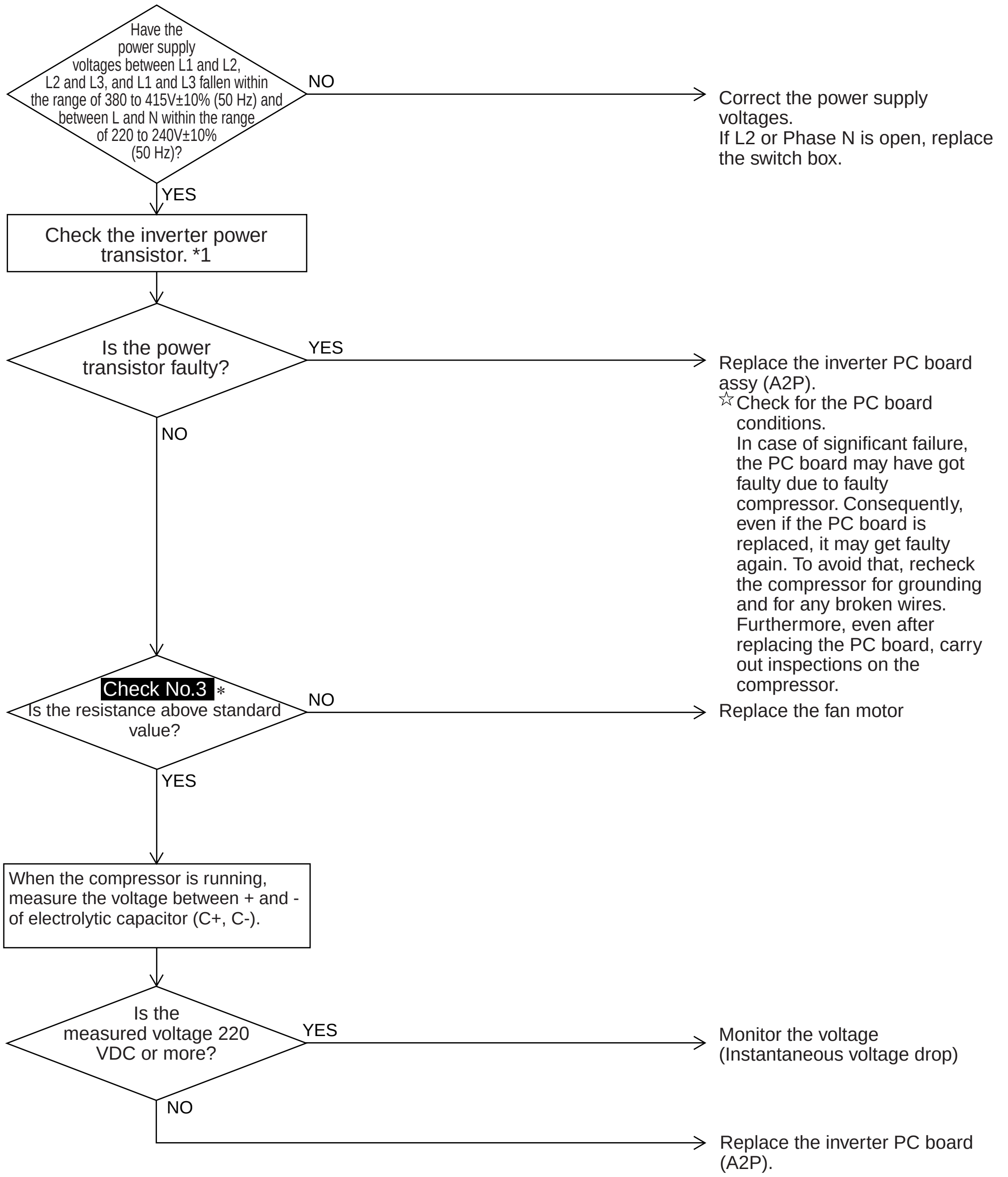
∗1: Refer to “Thermistor Resistance / Temperature Characteristics” table on P251.
∗2: Refer to “Pressure Sensor, Pressure / Voltage Characteristics” table on P254.

3.54 "U2" Power Supply Insufficient or Instantaneous Failure

Remote Control Display	U2
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Detection of voltage of main circuit capacitor built in the inverter and power supply voltage.
Malfunction Decision Conditions	When the abnormal voltage of main circuit capacitor built in the inverter and abnormal power supply voltage are detected.
Supposed Causes	■ Power supply insufficient ■ Instantaneous power failure ■ Defect of outdoor inverter PC board (A2P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Have the power supply voltages between L1 and L2, L2 and L3, and L1 and L3 fallen within the range of 380 to 415V±10% (50 Hz) and between L and N within the range of 220 to 240V±10% (50 Hz)?
NO
Correct the power supply voltages.
If L2 or Phase N is open, replace the switch box.
YES
Check the inverter power transistor. *1
Is the power transistor faulty?
YES
Replace the inverter PC board assy (A2P).
☆Check for the PC board conditions.
In case of significant failure, the PC board may have got faulty due to faulty compressor. Consequently, even if the PC board is replaced, it may get faulty again. To avoid that, recheck the compressor for grounding and for any broken wires. Furthermore, even after replacing the PC board, carry out inspections on the compressor.
NO
Check No.3 ∗
Is the resistance above standard value?
NO
Replace the fan motor
YES
When the compressor is running, measure the voltage between + and - of electrolytic capacitor (C+, C-).
Is the measured voltage 220 VDC or more?
YES
Monitor the voltage (Instantaneous voltage drop)
NO
Replace the inverter PC board (A2P).

(S2605)

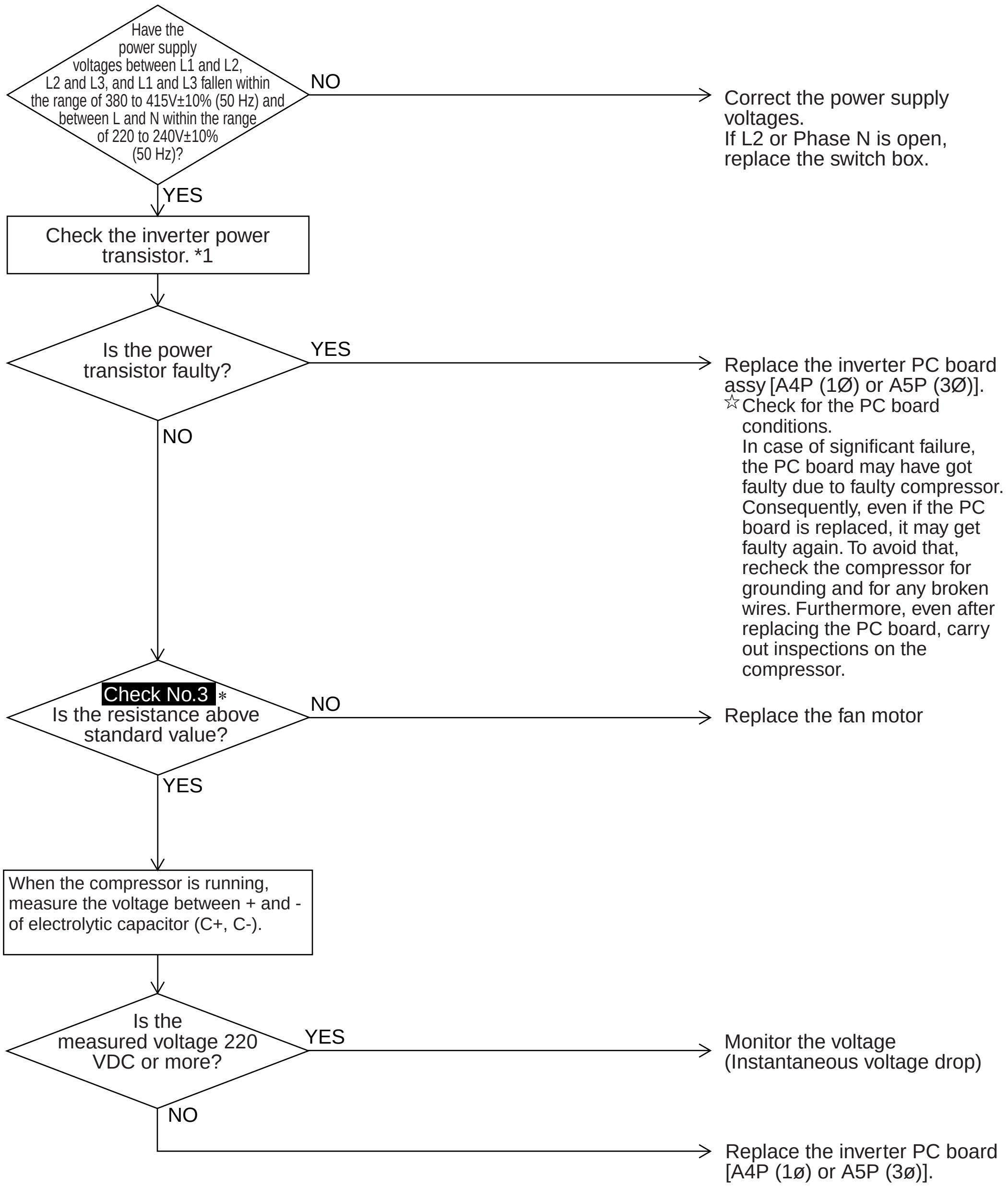
∗1: Inverter’s Power Transistors Check : Refer to information on P.255~257.

∗Check No.3 : Refer to information on P.221.

3.55 "U2" Power Supply Insufficient or Instantaneous Failure

Remote Control Display	U2 Subcode 20: high/low voltage problem Subcode 21: converter problem
Applicable Models	All indoor units
Method of Malfunction Detection	Detection of voltage of main circuit capacitor built in the inverter and power supply voltage.
Malfunction Decision Conditions	When the abnormal voltage of main circuit capacitor built in the inverter and abnormal power supply voltage are detected.
Supposed Causes	■ Power supply insufficient ■ Instantaneous power failure ■ Defect of indoor inverter PC board [A4P (1Ø) or A5P (3Ø)] ■ Converting problem
Troubleshooting	⚠**Warning**: CAPACITOR SHOCK HAZARD. The capacitors (top surfaces) can hold up to 220V. Use correct precautions when servicing.

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Have the power supply voltages between L1 and L2, L2 and L3, and L1 and L3 fallen within the range of 380 to 415V±10% (50 Hz) and between L and N within the range of 220 to 240V±10% (50 Hz)?
NO
Correct the power supply voltages.
If L2 or Phase N is open, replace the switch box.
YES
Check the inverter power transistor. *1
Is the power transistor faulty?
YES
Replace the inverter PC board assy [A4P (1Ø) or A5P (3Ø)].
☆Check for the PC board conditions.
In case of significant failure, the PC board may have got faulty due to faulty compressor. Consequently, even if the PC board is replaced, it may get faulty again. To avoid that, recheck the compressor for grounding and for any broken wires. Furthermore, even after replacing the PC board, carry out inspections on the compressor.
NO
Check No.3 ∗
Is the resistance above standard value?
NO
Replace the fan motor
YES
When the compressor is running, measure the voltage between + and - of electrolytic capacitor (C+, C-).
Is the measured voltage 220 VDC or more?
YES
Monitor the voltage (Instantaneous voltage drop)
NO
Replace the inverter PC board [A4P (1ø) or A5P (3ø)].

∗1: Inverter’s Power Transistors Check : Refer to information on P.255~257.

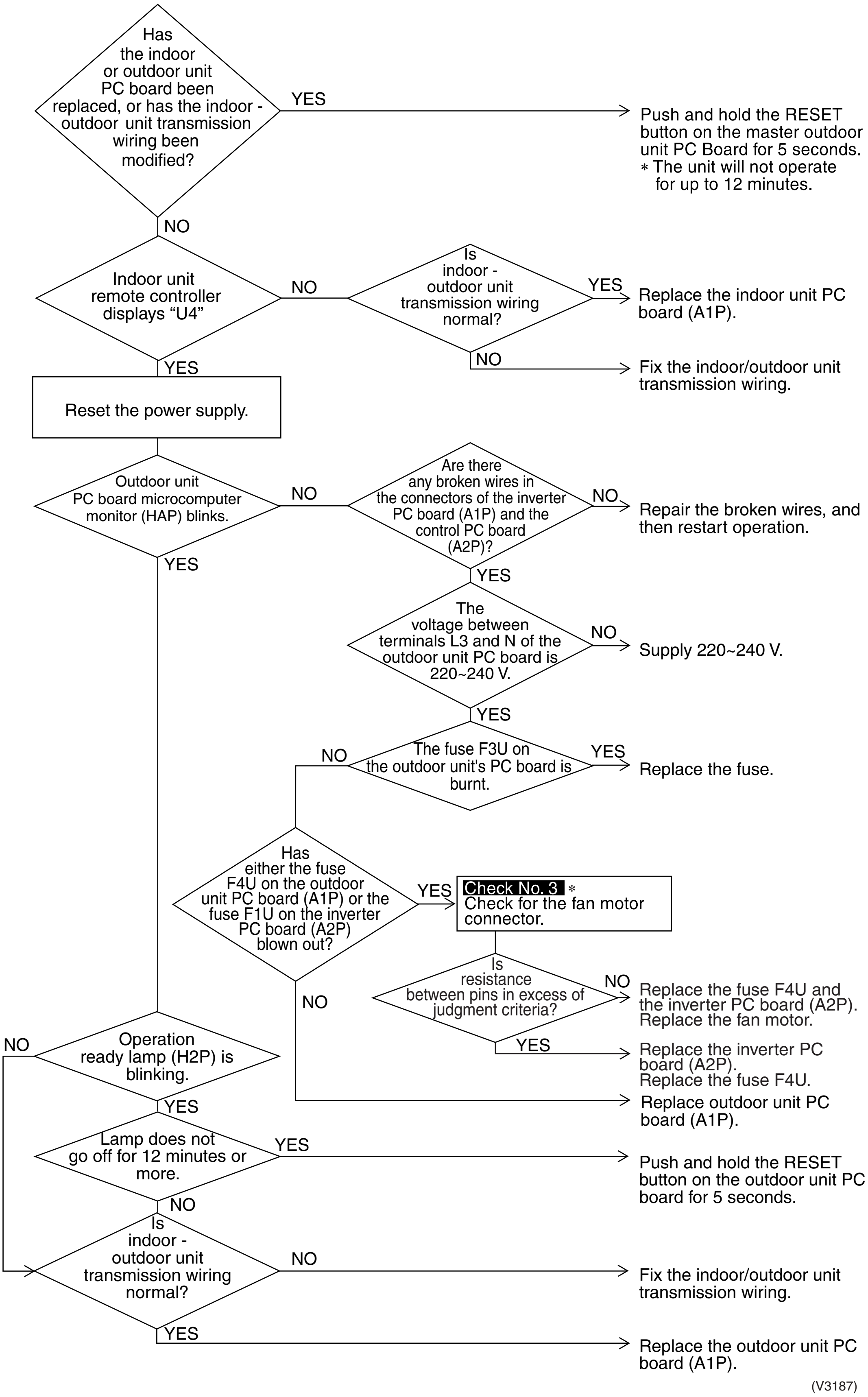
∗Check No.3 : Refer to information on P.221.

3.56 "U4" Malfunction of Transmission between Indoor Unit and Outdoor Unit

Remote Control Display	U4 U4 subcode 0
Applicable Models	AII indoor unit models ER*Q 011~016*
Method of Malfunction Detection	Microcomputer checks if transmission between indoor and outdoor unit is normal.
Malfunction Decision Conditions	When transmission is not carried out normally for a certain amount of time
Supposed Causes	■ Indoor to outdoor transmission wiring F1, F2 disconnection, short circuit or wrong wiring ■ Outdoor unit power supply is OFF ■ Defect of outdoor unit PC board ■ Defect of indoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Has the indoor or outdoor unit PC board been replaced, or has the indoor - outdoor unit transmission wiring been modified?
YES
Push and hold the RESET button on the master outdoor unit PC Board for 5 seconds.
∗ The unit will not operate for up to 12 minutes.
NO
Indoor unit remote controller displays "U4"
NO
Is indoor - outdoor unit transmission wiring normal?
YES
Replace the indoor unit PC board (A1P).
NO
Fix the indoor/outdoor unit transmission wiring.
YES
Reset the power supply.
Outdoor unit PC board microcomputer monitor (HAP) blinks.
NO
Are there any broken wires in the connectors of the inverter PC board (A1P) and the control PC board (A2P)?
NO
Repair the broken wires, and then restart operation.
YES
YES
The voltage between terminals L3 and N of the outdoor unit PC board is 220~240 V.
NO
Supply 220~240 V.
YES
NO
The fuse F3U on the outdoor unit's PC board is burnt.
YES
Replace the fuse.
Has either the fuse F4U on the outdoor unit PC board (A1P) or the fuse F1U on the inverter PC board (A2P) blown out?
YES
Check No. 3 ∗
Check for the fan motor connector.
Is resistance between pins in excess of judgment criteria?
NO
Replace the fuse F4U and the inverter PC board (A2P). Replace the fan motor.
YES
Replace the inverter PC board (A2P). Replace the fuse F4U.
NO
Replace outdoor unit PC board (A1P).
NO
Operation ready lamp (H2P) is blinking.
YES
Lamp does not go off for 12 minutes or more.
YES
Push and hold the RESET button on the outdoor unit PC board for 5 seconds.
NO
Is indoor - outdoor unit transmission wiring normal?
NO
Fix the indoor/outdoor unit transmission wiring.
YES
Replace the outdoor unit PC board (A1P).
(V3187)

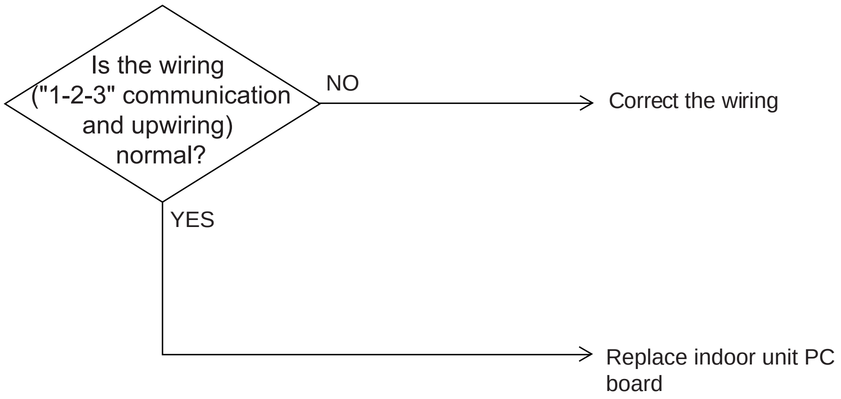
∗ Check No.3 : Refer to information on P221.

3.57 "U4" Malfunction of Transmission Indoor Unit

Remote Control Display	U4 Subcode 4
Applicable Models	AII indoor unit models
Method of Malfunction Detection	Microcomputer checks QA communication of indoor unit.
Malfunction Decision Conditions	When transmission is not carried out normally for a certain amount of time
Supposed Causes	■ Wrong wiring between indoor unit PC boards. [A4P (1Ø) or A5P (3Ø)] and A1P

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.

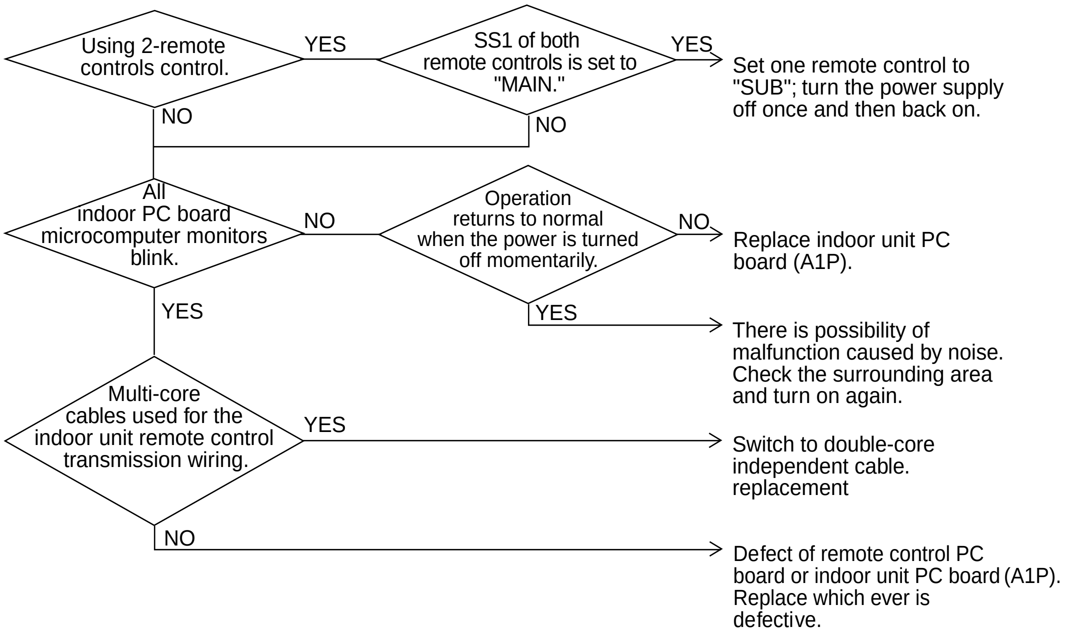

Is the wiring ("1-2-3" communication and upwiring) normal?
NO
Correct the wiring
YES
Replace indoor unit PC board

3.58 "U5" Malfunction of Transmission between Remote Control and Indoor Unit

Remote Control Display	U5 U5 Subcode 0
Applicable Models	AII indoor unit models
Method of Malfunction Detection	In case of controlling with 2-remote control, check the system using microcomputer is signal transmission between indoor unit and remote (correct if faulty) control (main and sub) is normal.
Malfunction Decision Conditions	Normal transmission does not continue for specified period.
Supposed Causes	■ Malfunction of indoor unit remote control transmission ■ Connection of two main remote controls (when using 2 remote controls) ■ Defect of indoor unit PC board (A1P) ■ Defect of remote control PC board ■ Malfunction of transmission caused by noise

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Using 2-remote controls control.
YES
SS1 of both remote controls is set to "MAIN."
YES
Set one remote control to "SUB"; turn the power supply off once and then back on.
NO
NO
All indoor PC board microcomputer monitors blink.
NO
Operation returns to normal when the power is turned off momentarily.
NO
Replace indoor unit PC board (A1P).
YES
YES
There is possibility of malfunction caused by noise. Check the surrounding area and turn on again.
Multi-core cables used for the indoor unit remote control transmission wiring.
YES
Switch to double-core independent cable. replacement
NO
Defect of remote control PC board or indoor unit PC board (A1P). Replace which ever is defective.

(V2823)

*Check No.3 : Refer to information on P221.

3.59 "U7" Indoor Unit: Malfunction of Transmission Outdoor Unit

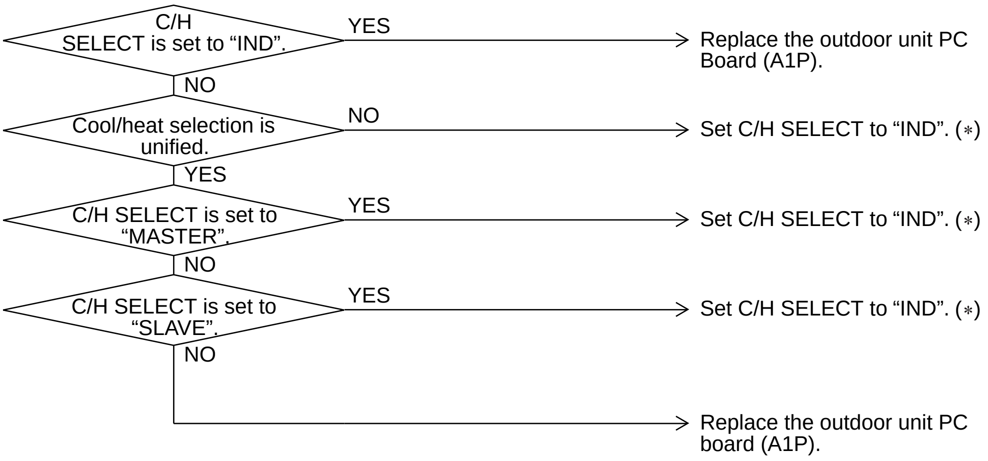
Remote Control Display	U7 Subcode 2
Applicable Models	ER*Q 011~016*
Method of Malfunction Detection	Microcomputer checks the transmission of outdoor unit.
Malfunction Decision Conditions	When transmission is not carried out normally for a certain amount of time

Supposed Causes

- Improper connection of transmission wiring between outdoor unit and external control adaptor for outdoor unit
- Improper cool/heat selection
- Improper cool/heat unified address (outdoor unit, external control adaptor for outdoor unit)
- Defect of outdoor unit PC board (A1P)
- Defect of external control adaptor for outdoor unit

Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


C/H SELECT is set to "IND".
YES
Replace the outdoor unit PC Board (A1P).
NO
Cool/heat selection is unified.
NO
Set C/H SELECT to "IND". (∗)
YES
C/H SELECT is set to "MASTER".
YES
Set C/H SELECT to "IND". (∗)
NO
C/H SELECT is set to "SLAVE".
YES
Set C/H SELECT to "IND". (∗)
NO
Replace the outdoor unit PC board (A1P).

(∗) To select "IND", press the BS2 button (set) till H3P led is on. Then press BS3 button (return) to confirm.

(V2824)

3.60 "U8" Malfunction of Transmission between Main and Sub Remote Controls

Remote Control Display

U8

Applicable Models

AII indoor unit models

Method of Malfunction Detection

In case of controlling with 2-remote control, check the system using microcomputer if signal transmission between indoor unit and remote control (main and sub) is normal.

Malfunction Decision Conditions

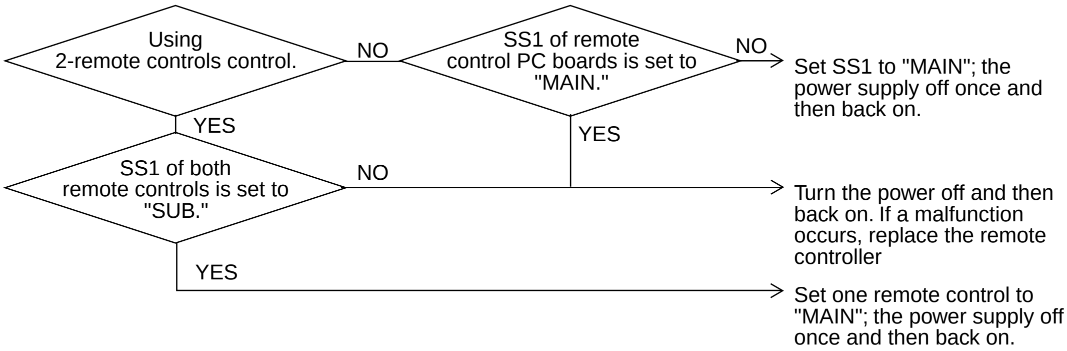
Normal transmission does not continue for specified period.

Supposed Causes

- Malfunction of transmission between main and sub remote control
- Connection between sub remote controls
- Defect of remote control PC board

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Using
2-remote controls control.
NO
SS1 of remote
control PC boards is set to
"MAIN."
NO
Set SS1 to "MAIN"; the power supply off once and then back on.
YES
YES
SS1 of both
remote controls is set to
"SUB."
NO
Turn the power off and then back on. If a malfunction occurs, replace the remote controller
YES
Set one remote control to "MAIN"; the power supply off once and then back on.

(V2825)

3.61 "UA" Communication Error between Outdoor Unit and Indoor Unit

Remote Control Display

UA
UA subcode 13
UA subcode 39

Applicable Models

AII indoor unit models
All outdoor unit models

Method of Malfunction Detection

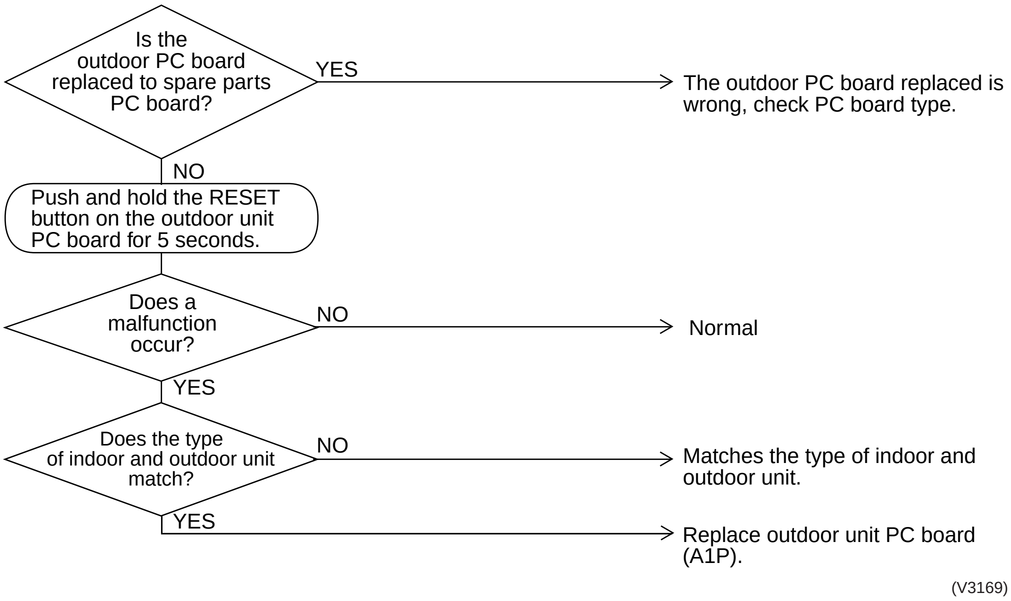
Malfunction Decision Conditions

Supposed Causes

- Excess of connected indoor units
- Defect of outdoor unit PC board (A1P)
- Mismatching of the type of indoor and outdoor unit.
- Setting of outdoor PC board was not conducted after replacing to spare parts PC board.

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Is the outdoor PC board replaced to spare parts PC board?
YES
The outdoor PC board replaced is wrong, check PC board type.
NO
Push and hold the RESET button on the outdoor unit PC board for 5 seconds.
Does a malfunction occur?
NO
Normal
YES
Does the type of indoor and outdoor unit match?
NO
Matches the type of indoor and outdoor unit.
YES
Replace outdoor unit PC board (A1P).
(V3169)

3.62 "UF" System is not Set yet

Remote Control Display

UF

UF subcode 6: QA wiring problem.

UF subcode 10: Transmission problem with outdoor unit.

Applicable Models

All models of indoor units
All models of outdoor units

Method of Malfunction Detection

Malfunction Decision Conditions

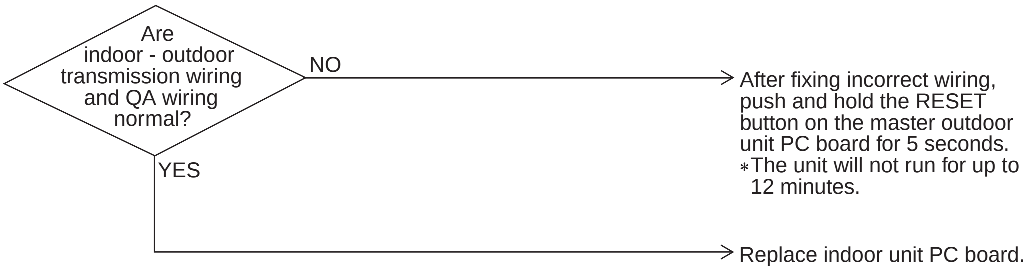
The malfunction is determined as soon as the abnormality aforementioned is detected through checking the system for any erroneous connection of unit.

Supposed Causes

- Improper connection of transmission wiring between indoor-outdoor unit
- QA wiring problem
- Defect of indoor unit PC board

Troubleshooting

Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Are indoor - outdoor transmission wiring and QA wiring normal?
NO
After fixing incorrect wiring, push and hold the RESET button on the master outdoor unit PC board for 5 seconds.
*The unit will not run for up to 12 minutes.
YES
Replace indoor unit PC board.

(V2830)

Note: Wiring check operation may not be successful if carried out after the outdoor unit has been off for more than 12 hours.

3.63 "UH" Malfunction of System, Refrigerant System Address Undefined

Remote Control Display

UH

UH subcode 0

Applicable Models

AII indoor unit models
All outdoor unit models

Method of Malfunction Detection

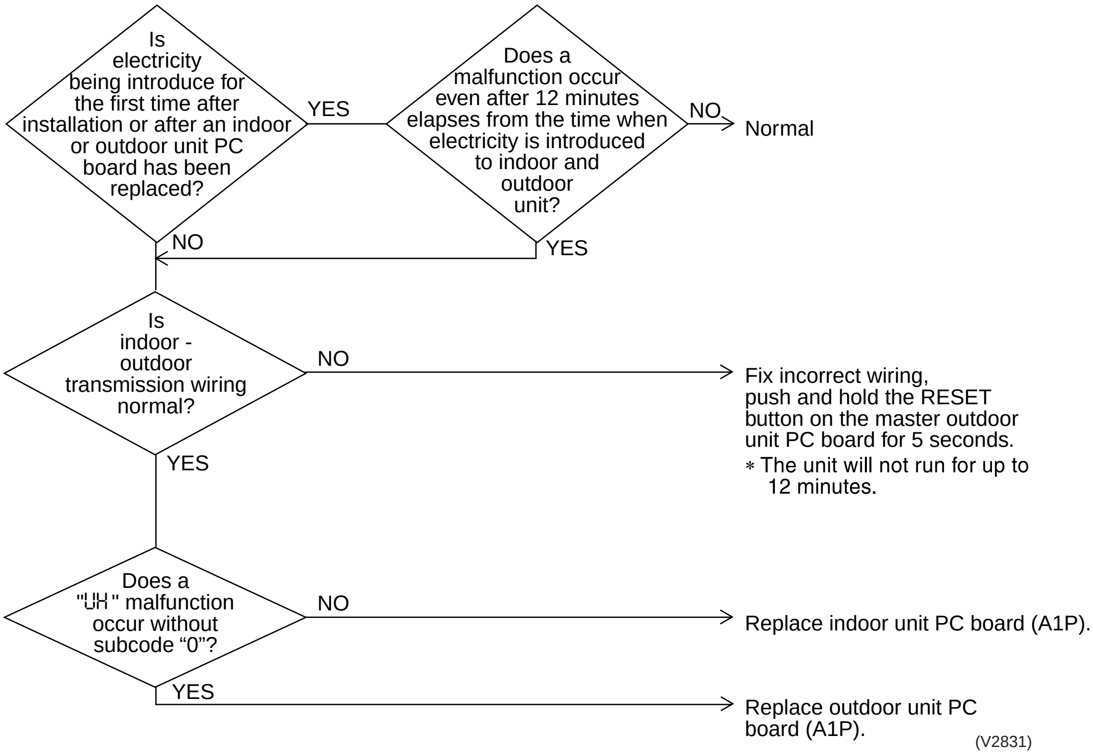
Malfunction Decision Conditions

Supposed Causes

- Improper connection of transmission wiring between outdoor unit and outdoor unit outside control adapter
- Defect of indoor unit PC board (A1P)
- Defect of outdoor unit PC board (A1P)

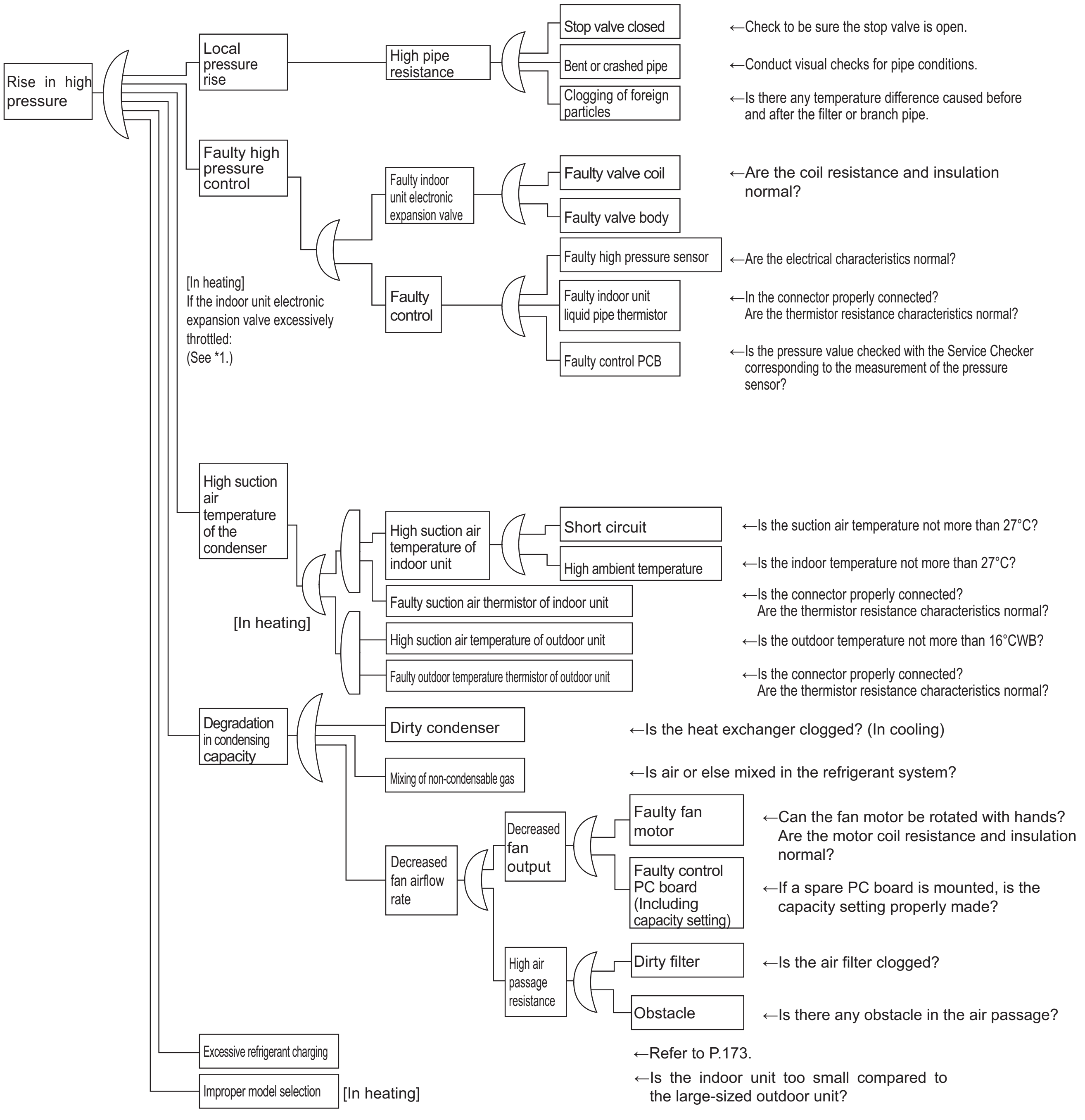
Troubleshooting

⚠ **Caution** Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


Is electricity being introduce for the first time after installation or after an indoor or outdoor unit PC board has been replaced?
YES
Does a malfunction occur even after 12 minutes elapses from the time when electricity is introduced to indoor and outdoor unit?
NO
Normal
NO
YES
Is indoor - outdoor transmission wiring normal?
NO
Fix incorrect wiring, push and hold the RESET button on the master outdoor unit PC board for 5 seconds.
∗ The unit will not run for up to 12 minutes.
YES
Does a "UH" malfunction occur without subcode "0"?
NO
Replace indoor unit PC board (A1P).
YES
Replace outdoor unit PC board (A1P).
(V2831)

[CHECK 1] Check for causes of rise in high pressure

Referring to the Fault Tree Analysis (FTA) shown below, probe the faulty points.

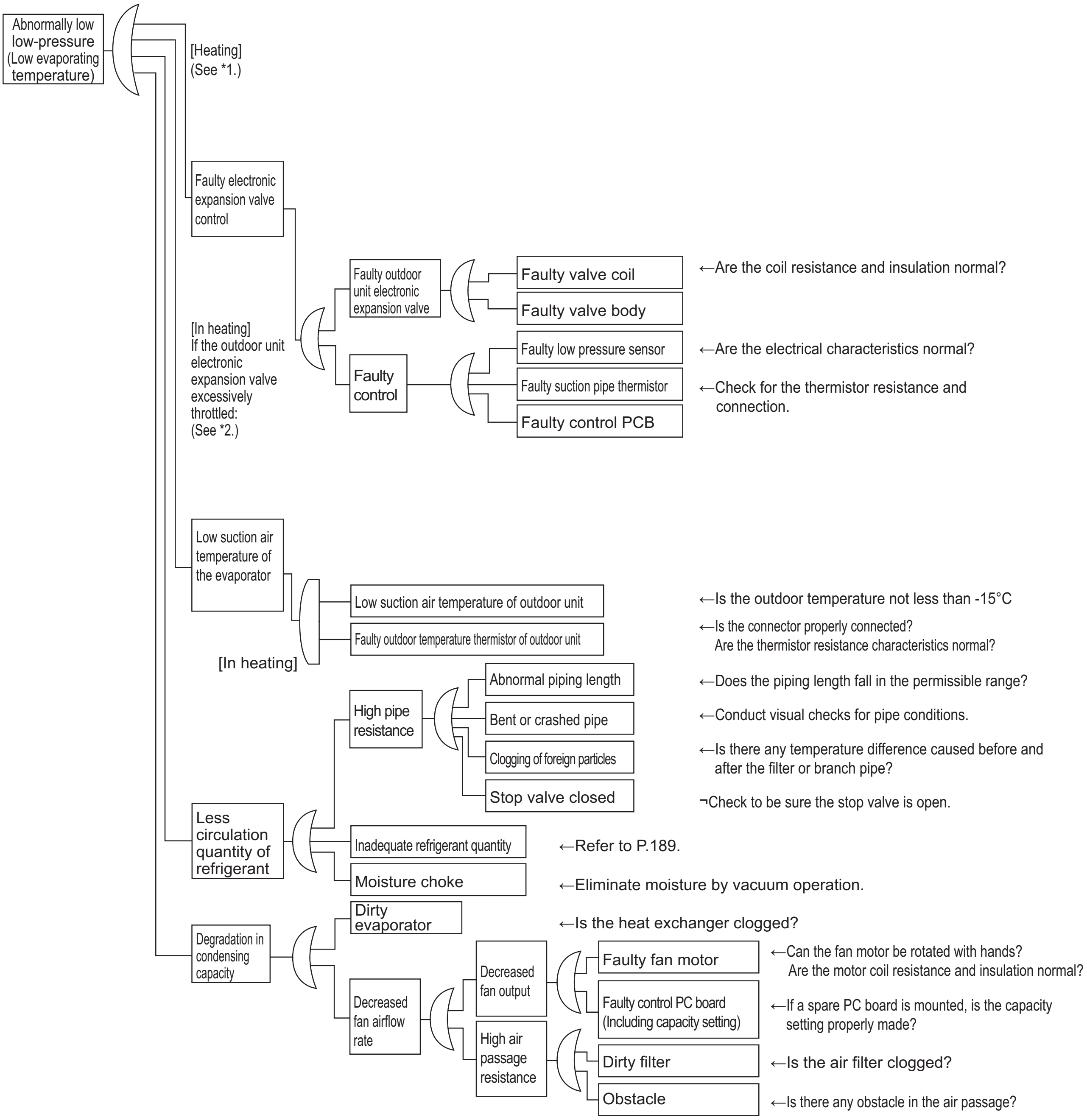

Rise in high pressure
Local pressure rise
High pipe resistance
Stop valve closed
←Check to be sure the stop valve is open.
Bent or crashed pipe
←Conduct visual checks for pipe conditions.
Clogging of foreign particles
←Is there any temperature difference caused before and after the filter or branch pipe.
Faulty high pressure control
Faulty indoor unit electronic expansion valve
Faulty valve coil
←Are the coil resistance and insulation normal?
Faulty valve body
Faulty control
Faulty high pressure sensor
←Are the electrical characteristics normal?
Faulty indoor unit liquid pipe thermistor
←In the connector properly connected? Are the thermistor resistance characteristics normal?
Faulty control PCB
←Is the pressure value checked with the Service Checker corresponding to the measurement of the pressure sensor?
[In heating] If the indoor unit electronic expansion valve excessively throttled: (See *1.)
High suction air temperature of the condenser
[In heating]
High suction air temperature of indoor unit
Short circuit
←Is the suction air temperature not more than 27°C?
High ambient temperature
←Is the indoor temperature not more than 27°C?
Faulty suction air thermistor of indoor unit
←Is the connector properly connected? Are the thermistor resistance characteristics normal?
High suction air temperature of outdoor unit
←Is the outdoor temperature not more than 16°CWB?
Faulty outdoor temperature thermistor of outdoor unit
←Is the connector properly connected? Are the thermistor resistance characteristics normal?
Degradation in condensing capacity
Dirty condenser
←Is the heat exchanger clogged? (In cooling)
Mixing of non-condensable gas
←Is air or else mixed in the refrigerant system?
Decreased fan airflow rate
Decreased fan output
Faulty fan motor
←Can the fan motor be rotated with hands? Are the motor coil resistance and insulation normal?
Faulty control PC board (Including capacity setting)
←If a spare PC board is mounted, is the capacity setting properly made?
High air passage resistance
Dirty filter
←Is the air filter clogged?
Obstacle
←Is there any obstacle in the air passage?
Excessive refrigerant charging
←Refer to P.173.
Improper model selection
[In heating]
←Is the indoor unit too small compared to the large-sized outdoor unit?

*1: In heating, the indoor unit electronic expansion valve is used for “subcooled degree control”.
(For details, refer to “Electronic Expansion Valve Control” on P.72.)

C: SDK04009

[CHECK 2] Check for causes of drop in low pressure

Referring to the Fault Tree Analysis (FTA) shown below, probe the faulty points.


Abnormally low low-pressure (Low evaporating temperature)
[Heating] (See *1.)
Faulty electronic expansion valve control
[In heating] If the outdoor unit electronic expansion valve excessively throttled: (See *2.)
Faulty outdoor unit electronic expansion valve
Faulty valve coil
Faulty valve body
Faulty control
Faulty low pressure sensor
Faulty suction pipe thermistor
Faulty control PCB
Low suction air temperature of the evaporator
[In heating]
Low suction air temperature of outdoor unit
Faulty outdoor temperature thermistor of outdoor unit
Less circulation quantity of refrigerant
High pipe resistance
Abnormal piping length
Bent or crashed pipe
Clogging of foreign particles
Stop valve closed
Inadequate refrigerant quantity
Moisture choke
Degradation in condensing capacity
Dirty evaporator
Decreased fan airflow rate
Decreased fan output
Faulty fan motor
Faulty control PC board (Including capacity setting)
High air passage resistance
Dirty filter
Obstacle

←Are the coil resistance and insulation normal?

←Are the electrical characteristics normal?

←Check for the thermistor resistance and connection.

←Is the outdoor temperature not less than -15°C

←Is the connector properly connected? Are the thermistor resistance characteristics normal?

←Does the piping length fall in the permissible range?

←Conduct visual checks for pipe conditions.

←Is there any temperature difference caused before and after the filter or branch pipe?

¬Check to be sure the stop valve is open.

←Refer to P.189.

←Eliminate moisture by vacuum operation.

←Is the heat exchanger clogged?

←Can the fan motor be rotated with hands? Are the motor coil resistance and insulation normal?

←If a spare PC board is mounted, is the capacity setting properly made?

←Is the air filter clogged?

←Is there any obstacle in the air passage?

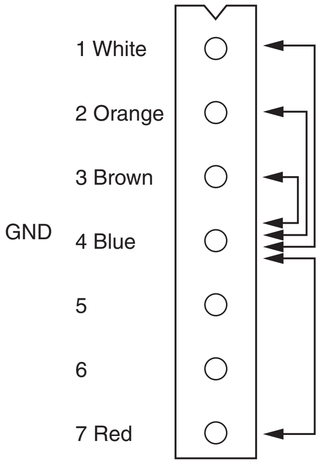
*1: The “low pressure protection control” includes low pressure protection control and hot gas bypass control. For details, refer to P.61.

*2: In heating, the outdoor unit electronic expansion valve (EV1) is used for “superheated degree control of outdoor unit heat exchanger”. (For details, refer to P.51.)

C: SDK04009

[CHECK 3] Check for Fan Motor Connector

(1) Turn the power supply off.
(2) With the fan motor connector on motor side disconnected, measure the resistance between each pin, then make sure that the resistance is more than the value mentioned in the following table.



Measurement point	Judgment
1 - 4	1MΩ or more
2 - 4	100kΩ or more
3 - 4	100Ω or more
4 - 7	100kΩ or more

Part 8 - Appendix

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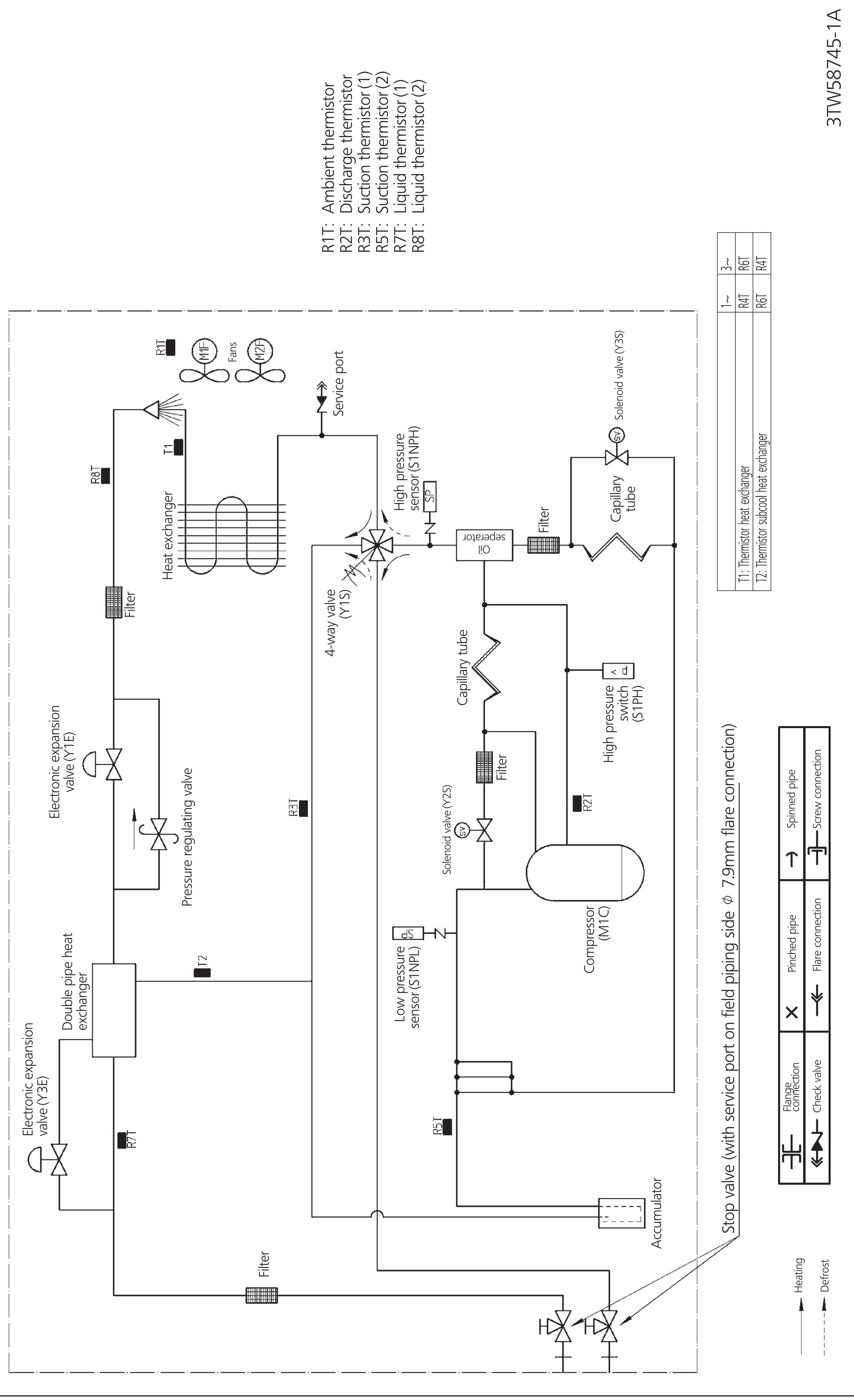
1. Piping Diagrams

1.1 Outdoor Unit

ERRQ + ERSQ 011/014/016 AAV1 + AAY1


3TW58745-1A
R1T: Ambient thermistor
R2T: Discharge thermistor
R3T: Suction thermistor (1)
R5T: Suction thermistor (2)
R7T: Liquid thermistor (1)
R8T: Liquid thermistor (2)
T1: Thermistor heat exchanger
T2: Thermistor subcool heat exchanger
1~ R4T R6T
3~ R6T R4T
R1T
M1F
Fans
M2F
Service port
T1
R8T
Heat exchanger
Filter
4-way valve (Y1S)
High pressure sensor (S1NPH)
SP
Oil seperator
Filter
Capillary tube
Solenoid valve (Y3S)
SV
Electronic expansion valve (Y1E)
Pressure regulating valve
R3T
Capillary tube
High pressure switch (S1PH)
P>
Filter
Solenoid valve (Y2S)
SV
R2T
Compressor (M1C)
Double pipe heat exchanger
T2
Low pressure sensor (S1NPL)
SP
Electronic expansion valve (Y3E)
R7T
R5T
Accumulator
Filter
Stop valve (with service port on field piping side ϕ 7.9mm flare connection)
Flange connection
Pinched pipe
Spinned pipe
Check valve
Flare connection
Screw connection
Heating
Defrost

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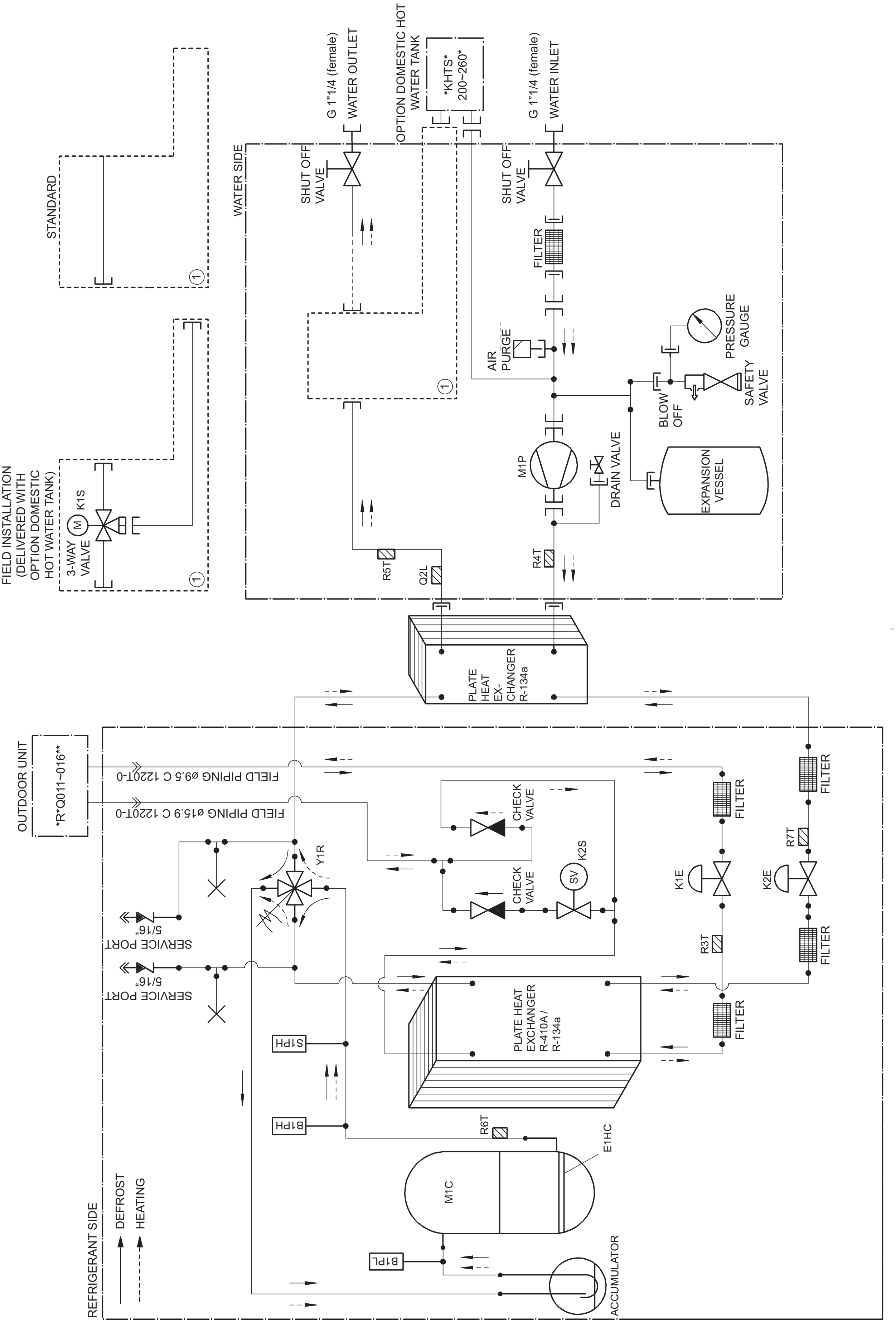
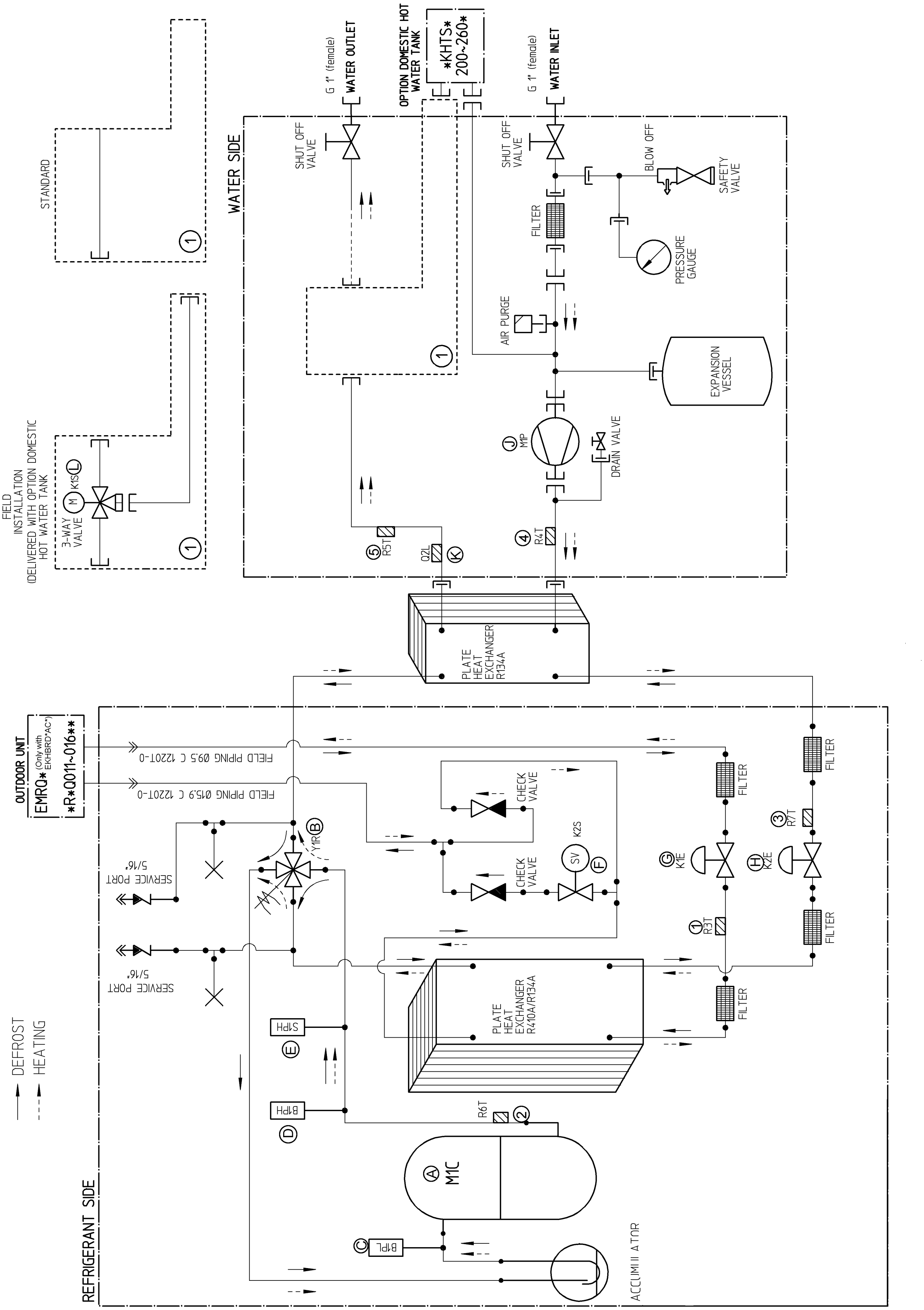
1.2 Indoor Unit

EKHBRD 011~016 AAV1/Y1



EKHBRD 011/014/016 AB/AC(V1/Y1)

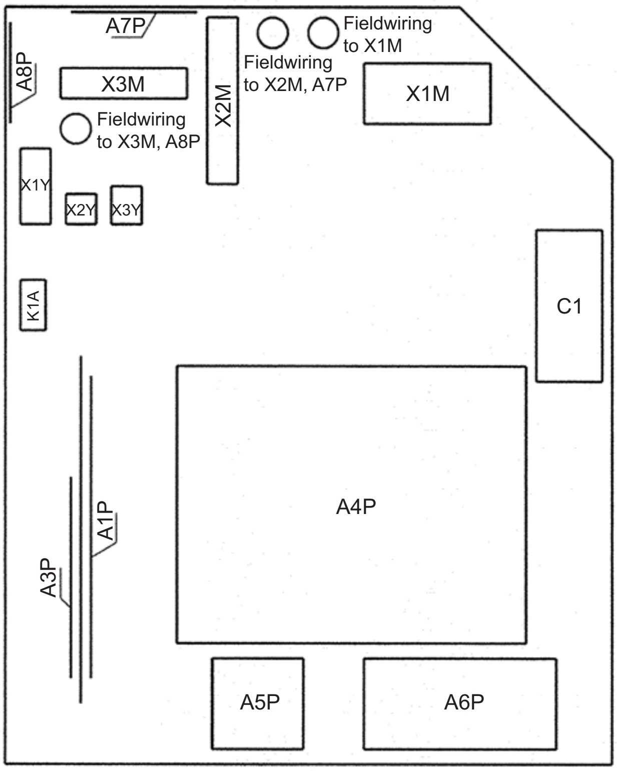


Legend

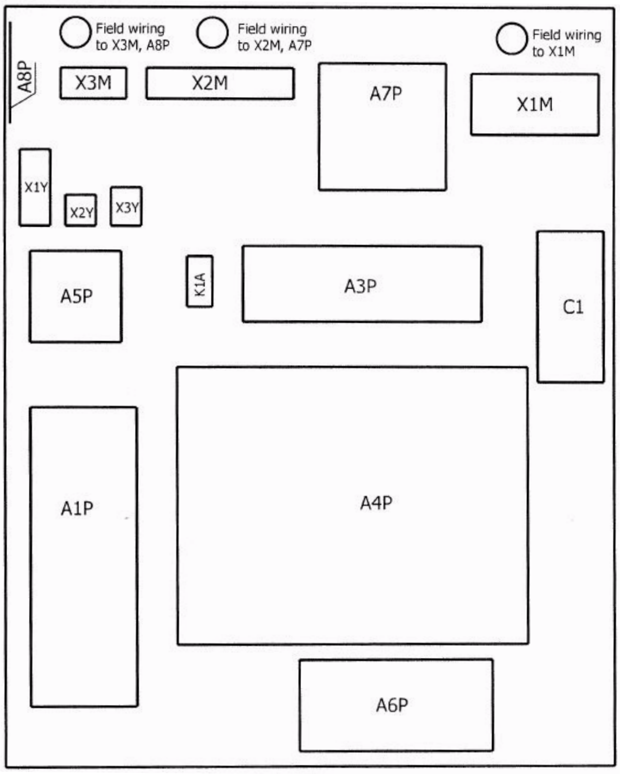
Part number	Description
R3T	Liquid thermistor R-410A
R4T	Returning water thermistor
R5T	Leaving water thermistor
R6T	Discharge thermistor
R7T	Liquid thermistor R-134a
S1PH	High pressure switch
B1PL	Low pressure sensor
B1PH	High pressure sensor
K1E	Electronic expansion valve R-410A
K2E	Electronic expansion valve R-134a
E1HC	Crankcase heater
Y1R	Four way valve
K2S	2 way valve
K1S	3 way valve
Q2L	Thermistor protector waterpiping
M1C	Compressor
M1P	DC invertor pump

1.3 Switch Box Layout

EKHBRD 011/014/016 AA V1



EKHBRD 011/014/016 AB/AC V1

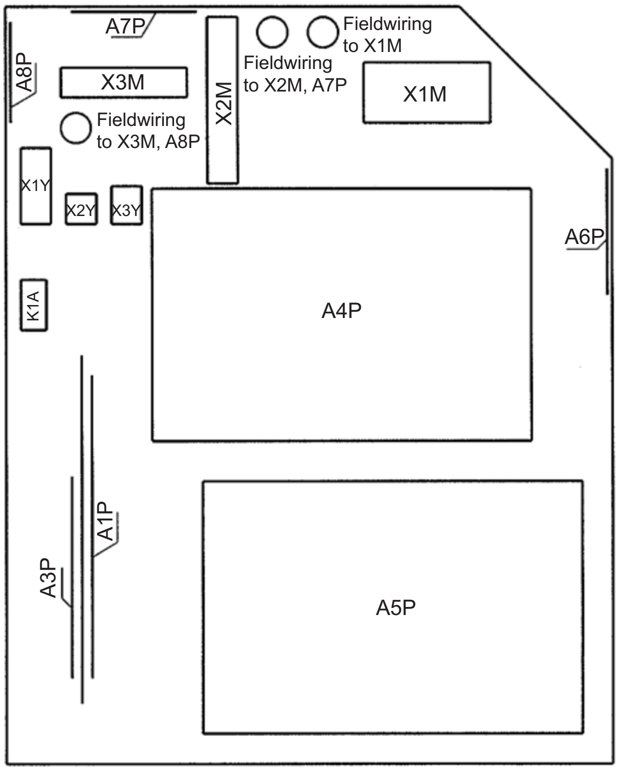


Legend

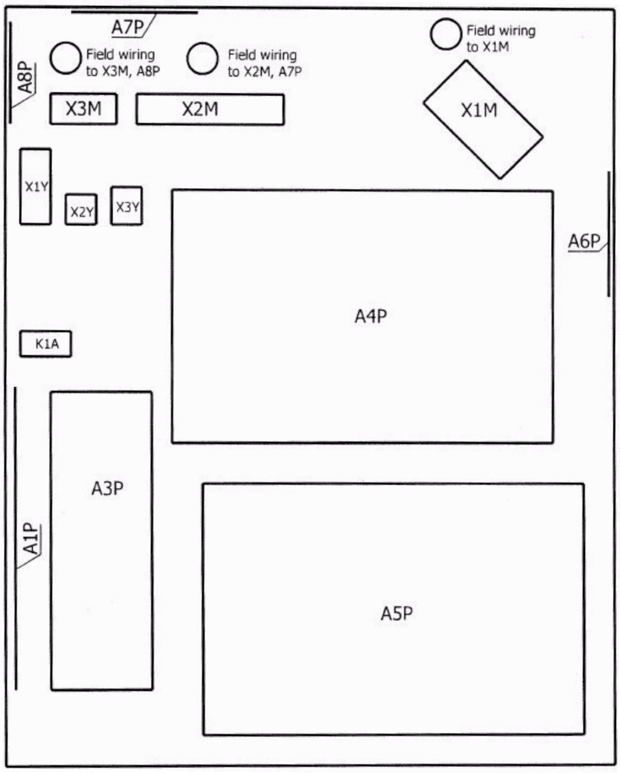
Part number		Description
A1P		Main PCB
A2P		User interface PCB - remote controller
A3P		Control PCB
A4P		Inverter PCB
A5P		QA PCB
A6P		Filter PCB
A7P	*	Digital I/O PCB
A8P	*	Demand PCB
A10P	*	Thermostat PCB
A11P	*	Receiver PCB
C1		Capacitor
K1A		Interface relay
X1M-X3M		Terminal strip
X1Y-X3Y		Connector

*: included in option kit

EKHBRD 011/014/016 AAY1



EKHBRD 011/014/016 AB/AC Y1



Legend

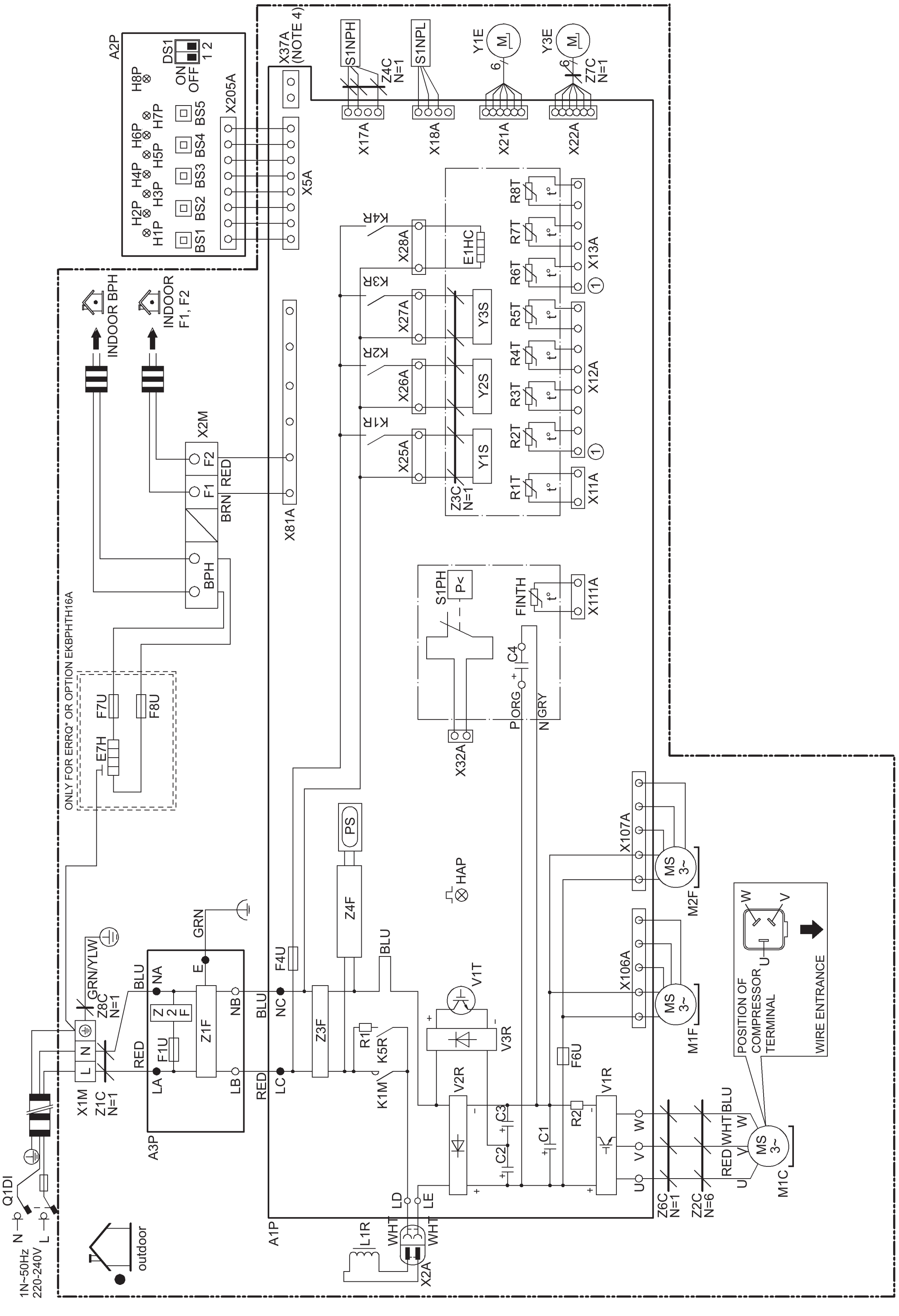
Part number		Description
A1P		Main PCB
A2P		User interface PCB - remote controller
A3P		Control PCB
A4P		Inverter control PCB
A5P		Inverter PCB
A6P		Filter PCB
A7P	*	Digital I/O PCB
A8P	*	Demand PCB
A10P	*	Thermostat PCB
A11P	*	Receiver PCB
K1A		Interface relay
X1M-X3M		Terminal strip
X1Y-X3Y		Connector

*: included in option kit

2. Wiring Diagrams

2.1 Outdoor Unit

ERRQ + ERSQ 011/014/016 V1



Legend

A1P	Printed circuit board (main)	Q1DI	Field earth leakage breaker (300 mA)
A2P	Printed circuit board (service)	R1	Resistor
A3P	Printed circuit board (noise filter)	R2	Resistor
BS1~BS5	Push button switch (mode, set, return, test, reset)	R1T	Thermistor (air)
C1~C4	Capacitor	R2T	Thermistor (discharge)
DS1	Dip switch	R3T	Thermistor (suction 1)
E1HC	Crankcase heater	R4T	Thermistor (heat exchanger)
E7H	Bottom plate heater	R5T	Thermistor (suction 2)
F1U, F4U	Fuse (T 6.3A / 250V)	R6T	Thermistor (subcooling h. ex)
F6U	Fuse (T 5.0A / 250V)	R7T	Thermistor (liquid pipe 1)
F7U, F8U	Fuse (F 1.0A / 250V)	R8T	Thermistor (liquid pipe 2)
FINTH	Thermistor (fin)	S1NPH	Pressure sensor (high)
H1P~H8P	Light emit. diode (serv. monitor-orange) [H2P] prepare. test --------- flickering malfunction detection -- light up	S1NPL	Pressure sensor (low)
		S1PH	Pressure switch (high)
HAP	Light emitting diode	V1R	Power module
(A1P)	(service monitor green)	V2R, V3R	Diode module
K1M	Magnetic contactor (M1C)	V1T	IGBT
K1R	Magnetic relay (Y1S)	X1M	Terminal strip (power supply)
K2R	Magnetic relay (Y2S)	X2M	Terminal strip (control)
K3R	Magnetic relay (Y3S)	X1M	Terminal strip (C/H selector) (A4P)
K4R	Magnetic relay (E1HC)	Y1E	Electronic expansion valve (main)
K5R	Magnetic relay	Y3E	Electronic expansion valve (subcool)
L1R	Reactor	Y1S	Solenoid valve (4 way valve)
M1C	Motor (compressor)	Y2S	Solenoid valve (hot gas)
M1F	Motor (fan) (upper)	Y3S	Solenoid valve (U/L circuit)
M2F	Motor (fan) (lower)	Z1C~Z8C	Noise filter (ferrity core)
PS	Switching power supply	Z1F~Z4F	Noise filter

Notes

1 This wiring diagram only applies to the outdoor unit

2 L: live, N: neutral

▬ Field wiring

3 ☐☐☐ Terminal strip ⊡ Connector

-•- Connection ⊜ Protective earth (screw)

▬⊃- Relay connector ⏚ Noiseless earth

-○- Terminal

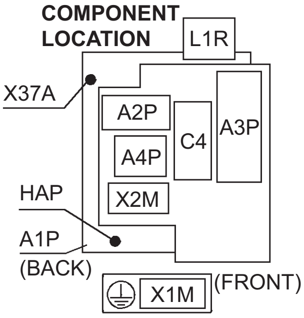
4 Refer to the “Wiring diagram sticker” (on back of front plate) on how to use BS1~BS5 and DS1, DS2 switch

5 Do not operate the unit by short-circuiting protection device S1PH

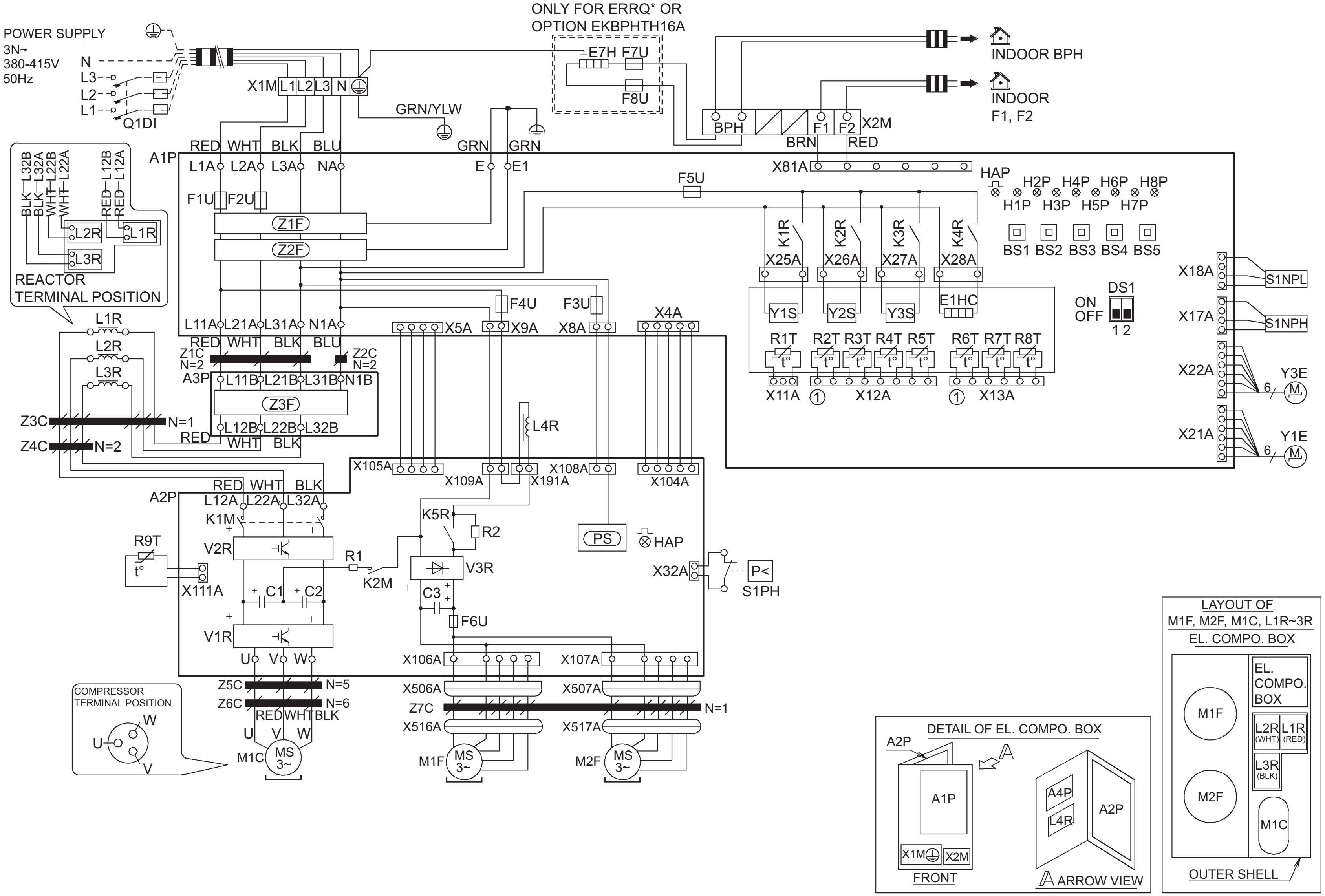
6 Colors: BLU = Blue, BRN = Brown, GRN = Green, RED = Red, WHT = White, YLW = Yellow, ORG = Orange

7 Refer to the installation manual, for connection wiring to indoor - outdoor transmission F1-F2

8 ⬚ Option



ERRQ + ERSQ 011/014/016 Y1



Legend

A1P	Printed circuit board	M1C	Motor (compressor)
A2P	Printed circuit board (inv.)	M1F	Motor (upper fan)
A3P	Printed circuit board (noise filter)	M2F	Motor (lower fan)
BS1~BS5	Push button switch mode, set, return, test, reset	PS	Power supply
		R1, R2	Resistor
C1-C3	Capacitor	R1T	Thermistor (air)
DS1	Dip switch	R2T	Thermistor (M1C discharge)
E1HC	Crankcase heater	R3T	Thermistor (suction 1)
F1U	Fuse (A 31.5A / 500V)	R4T	Thermistor (subcool)
F2U	Fuse (A 31.5A / 500V)	R5T	Thermistor (suction 2)
F3U	Fuse (T 6.3A / 250V)	R6T	Thermistor (coil)
F4U	Fuse (T 6.3A / 250V)	R7T	Thermistor (liquid 1)
F5U	Fuse (T 6.3A / 250V)	R8T	Thermistor (liquid 2)
F6U	Fuse (T 5A / 250V)	R9T	Thermistor (power module)
F7U	Fuse (F 1.0A / 250V)	S1NPH	Pressure sensor (high)
F8U	Fuse (F 1.0A / 250V)	S1NPL	Pressure sensor (low)
E7H	Bottom plate heater	S1PH	Pressure switch (high)
HAP (A1P)	Pilot lamp (service monitor-green)	V1R, V2R	Power module
HAP (A2P)	Pilot lamp (service monitor-green)	V3R	Diode module
H1P~8P(A1P)	Pilot lamp (service monitor-orange) [H2P] prepare. test --------- flickering malfunction detection -- light up	X1M	Terminal strip
		X2M	Terminal strip (control)
K1M, K2M	Magnetic contactor	Y1E	Expansion valve (main)
K1R (A1P)	Magnetic relay (Y1S)	Y3E	Expansion valve (subcool)
K2R (A1P)	Magnetic relay (Y2S)	Y1S	4 way valve
K3R (A1P)	Magnetic relay (Y3S)	Y2S	Solenoid valve (hot gas)
K4R (A1P)	Magnetic relay (E1HC)	Y3S	Solenoid valve (U/L circuit)
K5R (A2P)	Magnetic relay	Z1C~7C	Noise filter
L1R~3R	Reactor	Z1F~3F	Noise filter
L4R	Reactor (for outdoor fan motor)	Q1DI	Field earth leakage breaker (300mA)

Notes

1 This wiring diagram is applied only to the outdoor unit

2 ▪▪▪ Field wiring

3 -o- Terminal strip ⊳ Movable connector

⊠⊠ ⊳ Fixed connector ▭▭▭ Terminal

⊜ Protective earth (screw) ⏚ Noiseless earth

4 When using the option adaptor, refer to the installation manual

5 Refer to “operation caution label” (on back of front plate) how to use BS1~BS5 and DS1 switch

6 When operating, don’t short circuit for protection device (S1PH)

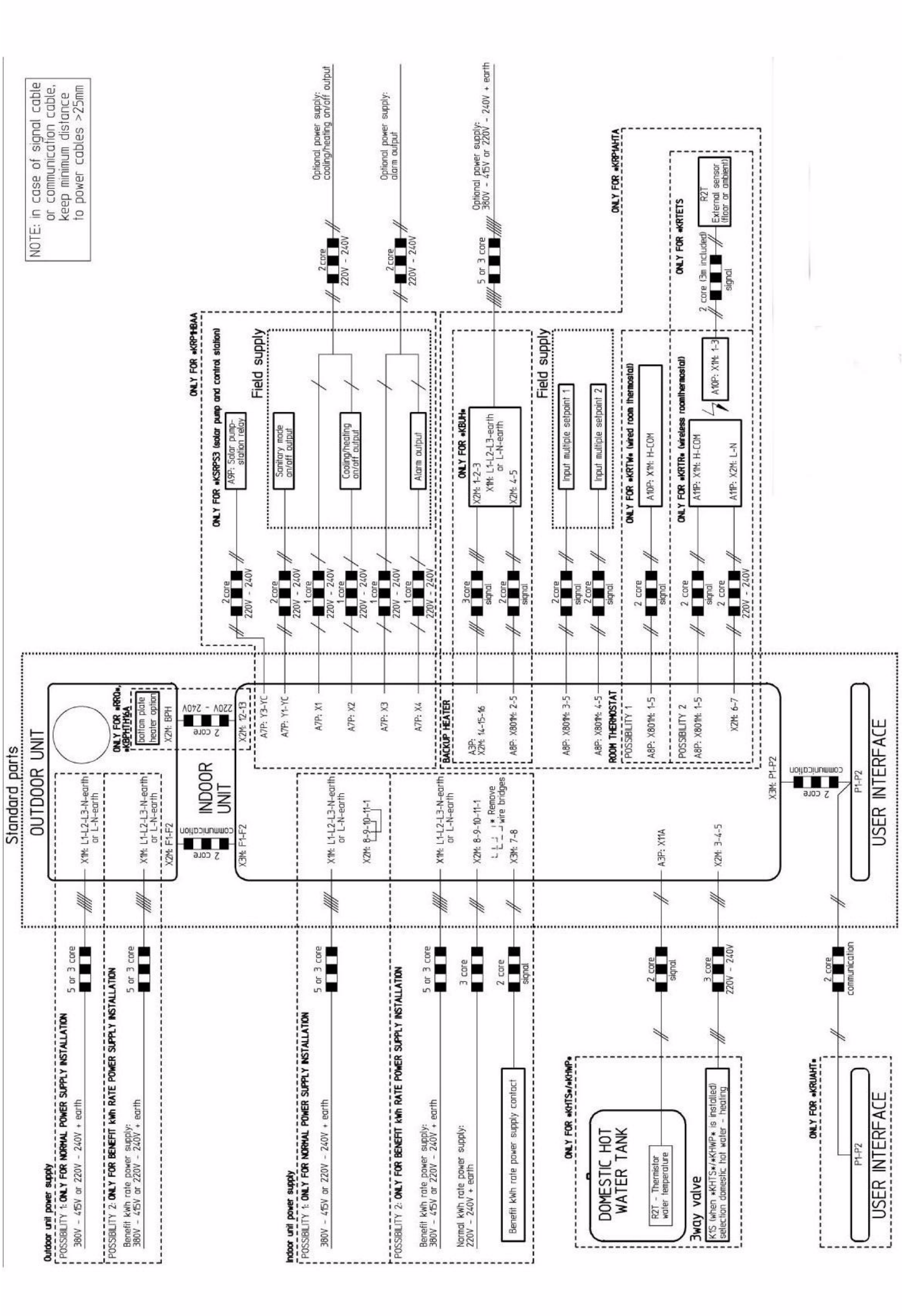
7 Colors: BLU = Blue, BRN = Brown, GRN = Green, RED = Red, WHT = White

8 When using the central control system, connect outdoor-outdoor transmition to F1, F2

9 ⬚ Option

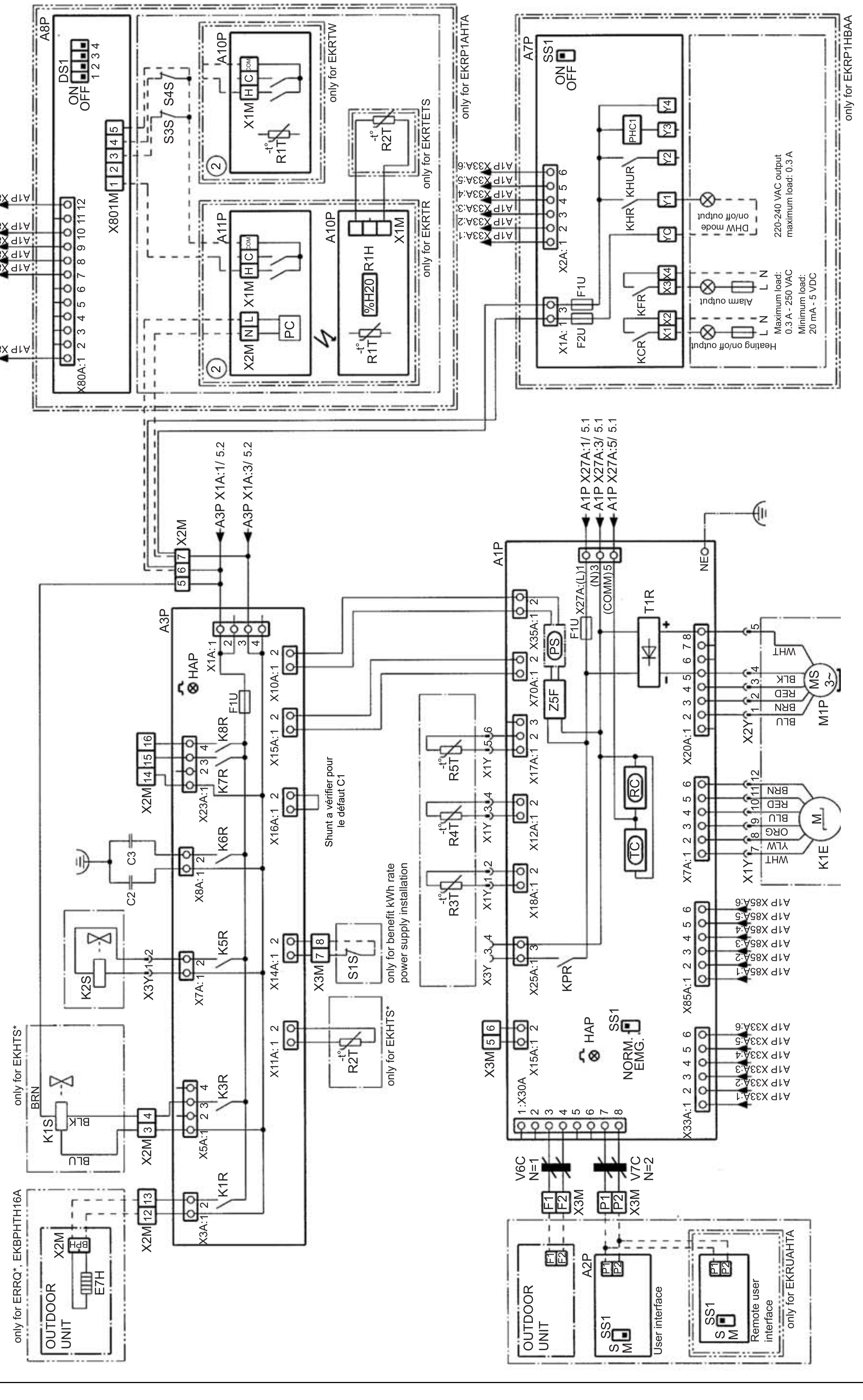
2.2 Field Wiring Connection Diagram

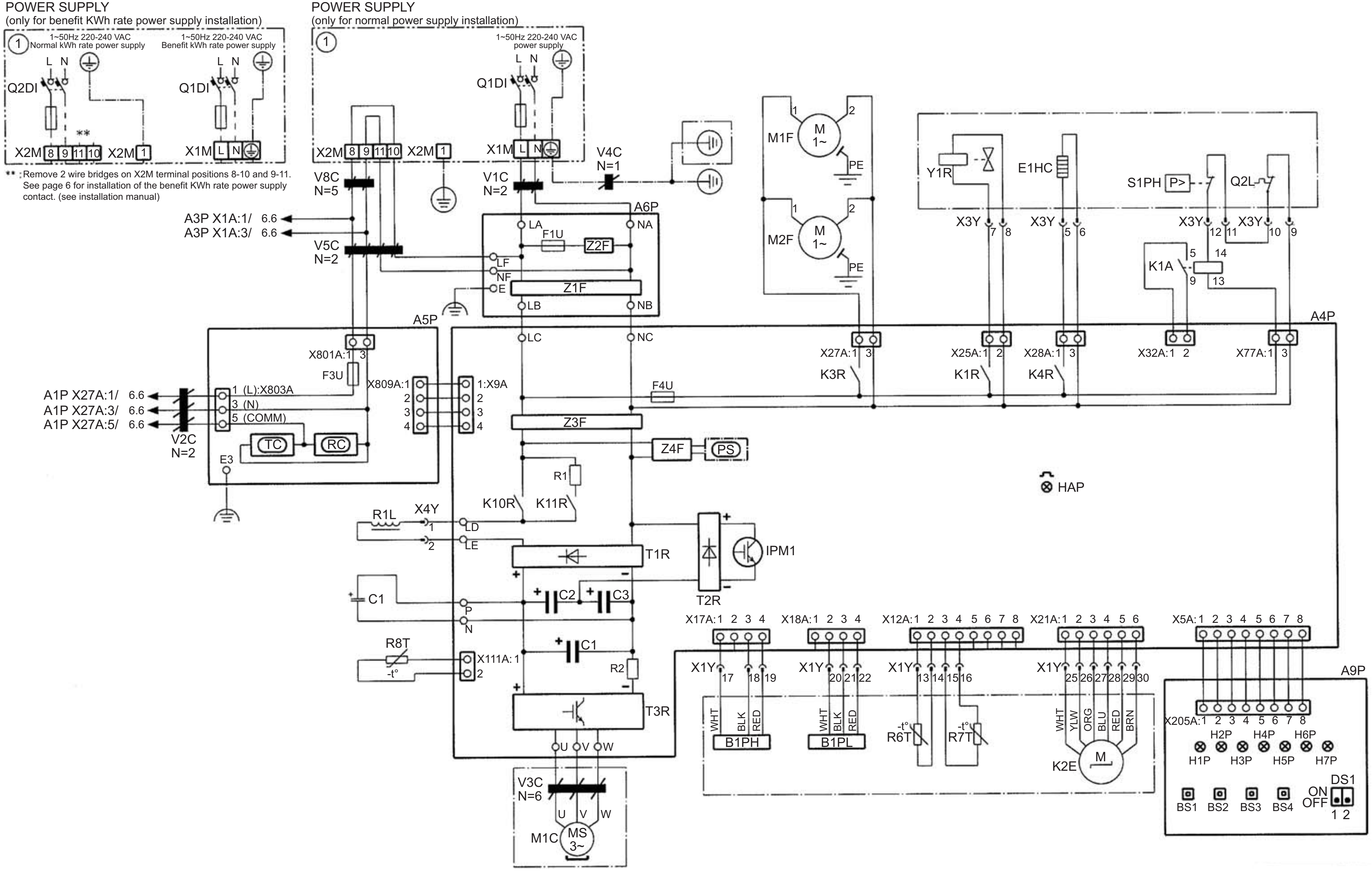
ERRQ + ERSQ 011/014/016 A(V1)/(Y1) in combination with EKHBRD*


Standard parts
OUTDOOR UNIT
Outdoor unit power supply
POSSIBILITY 1: ONLY FOR NORMAL POWER SUPPLY INSTALLATION
380V - 415V or 220V - 240V + earth
5 or 3 core
X1M: L1-L2-L3-N-earth or L-N-earth
POSSIBILITY 2: ONLY FOR BENEFIT kWh RATE POWER SUPPLY INSTALLATION
Benefit kWh rate power supply: 380V - 415V or 220V - 240V + earth
X2M: F1-F2
ONLY FOR *RRQ*, *KBPHTH16A
bottom plate heater option
X2M: BPH
2 core communication
2 core 220V - 240V
INDOOR UNIT
X3M: F1-F2
X2M: 12-13
A7P: Y3-YC
A7P: Y1-YC
A7P: X1
A7P: X2
A7P: X3
A7P: X4
Indoor unit power supply
X2M: 8-9-10-11-1
Normal kWh rate power supply: 220V - 240V + earth
3 core
X2M: 8-9-10-11-1
* Remove wire bridges
Benefit kWh rate power supply contact
2 core
signal
X3M: 7-8
BACKUP HEATER
A3P: X2M: 14-15-16
A8P: X801M: 2-5
A8P: X801M: 3-5
A8P: X801M: 4-5
ROOM THERMOSTAT
POSSIBILITY 1
A8P: X801M: 1-5
POSSIBILITY 2
A8P: X801M: 1-5
X2M: 6-7
X3M: P1-P2
ONLY FOR *KRP1HBAA
ONLY FOR *KSRPS3 (solar pump and control station)
2 core
220V - 240V
A9P: Solar pump-station relay
Field supply
1 core
Sanitary mode on/off output
Cooling/heating on/off output
Alarm output
Optional power supply: cooling/heating on/off output
Optional power supply: alarm output
ONLY FOR *KBUH*
X2M: 1-2-3
X1M: L1-L2-L3-earth or L-N-earth
X2M: 4-5
Optional power supply: 380V - 415V or 220V - 240V + earth
Input multiple setpoint 1
Input multiple setpoint 2
ONLY FOR *KRP1AHTA
ONLY FOR *KRTW* (wired room thermostat)
A10P: X1M: H-COM
ONLY FOR *KRTR* (wireless roomthermostat)
A11P: X1M: H-COM
A11P: X2M: L-N
A10P: X1M: 1-3
ONLY FOR *KRTETS
2 core (3m included)
R2T External sensor (floor or ambient)
NOTE: in case of signal cable or communication cable, keep minimum distance to power cables >25mm
ONLY FOR *KHTS*/*KHWP*
DOMESTIC HOT WATER TANK
R2T - Thermistor water temperature
A3P: X11A
3way valve
K1S (when *KHTS*/*KHWP* is installed) selection domestic hot water - heating
X2M: 3-4-5
ONLY FOR *KRUAHT*
communication
P1-P2
USER INTERFACE

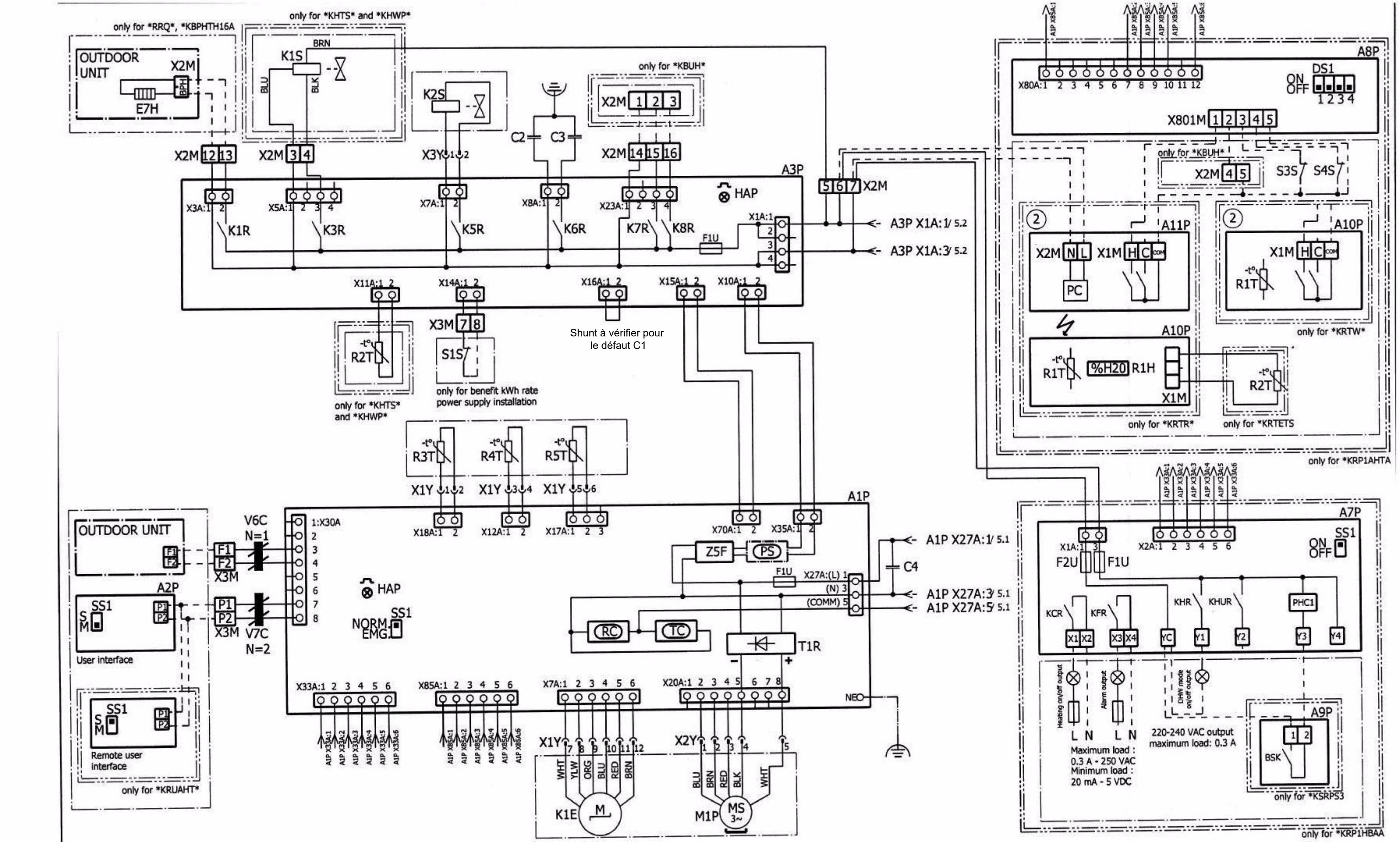
2.3 Indoor Unit

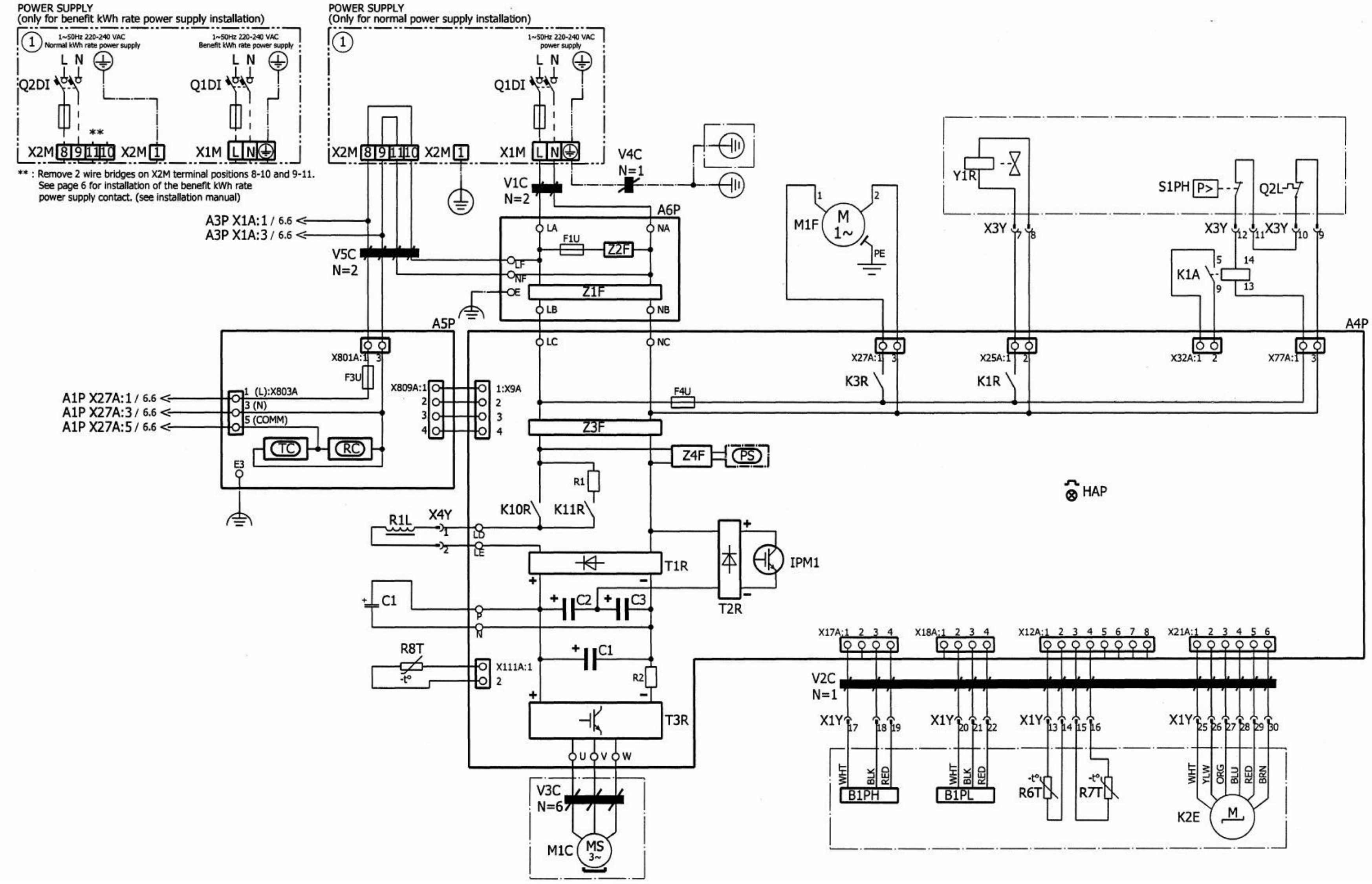
EKHBRD 011/014/016 AA V1




POWER SUPPLY
(only for benefit KWh rate power supply installation)
1~50Hz 220-240 VAC Normal kWh rate power supply
1~50Hz 220-240 VAC Benefit kWh rate power supply
L N
Q2DI
Q1DI
**
X2M 8 9 11 10
X2M 1
X1M L N
** : Remove 2 wire bridges on X2M terminal positions 8-10 and 9-11. See page 6 for installation of the benefit KWh rate power supply contact. (see installation manual)
POWER SUPPLY
(only for normal power supply installation)
1~50Hz 220-240 VAC power supply
V8C N=5
V1C N=2
V4C N=1
V5C N=2
A3P X1A:1/ 6.6
A3P X1A:3/ 6.6
A6P
LA NA F1U Z2F LF NF E Z1F LB NB
A5P
X801A:1 3
F3U
X809A:1 2 3 4
1:X9A 2 3 4
1 (L):X803A
3 (N)
5 (COMM)
TC RC
E3
A1P X27A:1/ 6.6
A1P X27A:3/ 6.6
A1P X27A:5/ 6.6
V2C N=2
LC NC
F4U
Z3F
Z4F PS
R1
K10R K11R
R1L X4Y 1 2 LD LE
T1R
T2R
IPM1
C1
P N
C2 C3
C1
R8T -t°
X111A:1 2
R2
T3R
U V W
V3C N=6
M1C MS 3~
M1F M 1~ 1 2 PE
M2F M 1~ 1 2 PE
Y1R
E1HC
S1PH P>
Q2L
X3Y 7 8
X3Y 5 6
X3Y 12 11
X3Y 10 9
K1A 5 14 9 13
A4P
X27A:1 3
X25A:1 2
X28A:1 3
X32A:1 2
X77A:1 3
K3R K1R K4R
HAP
X17A:1 2 3 4
X18A:1 2 3 4
X12A:1 2 3 4 5 6 7 8
X21A:1 2 3 4 5 6
X5A:1 2 3 4 5 6 7 8
X1Y 17 18 19
X1Y 20 21 22
X1Y 13 14 15 16
X1Y 25 26 27 28 29 30
WHT BLK RED
B1PH
WHT BLK RED
B1PL
R6T -t°
R7T -t°
WHT YLW ORG BLU RED BRN
K2E M
A9P
X205A:1 2 3 4 5 6 7 8
H2P H4P H6P
H1P H3P H5P H7P
DS1 ON OFF 1 2
BS1 BS2 BS3 BS4

EKHBRD 011/014/016 AB/AC V1




POWER SUPPLY
(only for benefit kWh rate power supply installation)
1~50Hz 220-240 VAC
Normal kWh rate power supply
1~50Hz 220-240 VAC
Benefit kWh rate power supply
L N
Q2DI
Q1DI
**
X2M 8 9 11 10 X2M 1
X1M L N
** : Remove 2 wire bridges on X2M terminal positions 8-10 and 9-11.
See page 6 for installation of the benefit kWh rate
power supply contact. (see installation manual)
POWER SUPPLY
(Only for normal power supply installation)
1~50Hz 220-240 VAC
power supply
V4C
N=1
V1C
N=2
A6P
A3P X1A:1 / 6.6
A3P X1A:3 / 6.6
V5C
N=2
LA
NA
F1U
Z2F
LF
NF
E
Z1F
LB
NB
A5P
LC
NC
A4P
X801A:1 3
F3U
X809A:1 2 3 4
1:X9A 2 3 4
A1P X27A:1 / 6.6
A1P X27A:3 / 6.6
A1P X27A:5 / 6.6
1 (L):X803A
3 (N)
5 (COMM)
TC
RC
E3
F4U
Z3F
Z4F
PS
R1
K10R
K11R
R1L
X4Y
1
2
LD
LE
T1R
IPM1
T2R
C1
P
N
C2
C3
R8T
-t°
X111A:1
2
R2
T3R
U V W
V3C
N=6
M1C
MS
3~
Y1R
M1F
M
1~
PE
X3Y 7 8
S1PH
P>
Q2L
X3Y 12 11
X3Y 10 9
K1A
5 14 9 13
X27A:1 3
K3R
X25A:1 2
K1R
X32A:1 2
X77A:1 3
HAP
X17A:1 2 3 4
X18A:1 2 3 4
X12A:1 2 3 4 5 6 7 8
X21A:1 2 3 4 5 6
V2C
N=1
X1Y 17 18 19
X1Y 20 21 22
X1Y 13 14 15 16
X1Y 25 26 27 28 29 30
WHT BLK RED
B1PH
WHT BLK RED
B1PL
R6T
R7T
WHT YLW ORG BLU RED BRN
K2E
M

Legend

Part number		Description
B1PH		High pressure sensor
B1PL		Low pressure sensor
BS1 - BS4 (A9P)		Push button
C1		Capacitor
C2 - C3		Filter capacitor
C1 - C3 (A4P)		PCB capacitor
DS1 (A*P)		Dipswitch
E7H	*	Bottom plate heater (only in combination with ERRQ* outdoor unit or ERSQ* outdoor unit with option EKBPHTH16A)
E1HC		Crankcase heater
F1U (A1P, A3P)		Fuse (T, 3.15A, 250V)
F1U (A6P)		Fuse (T, 6.3A, 250V)
F1U - F2U (A7P)	*	Fuse (5A, 250V)
F3U - F4U		Fuse (T, 6.3A, 250V)
H1P - H7P (A9P)		PCB LED
HAP (A*P)		PCB LED
IPM1		Integrated power module
K1A		Interface relay
K1E		Electronic expansion valve
K2E		Electronic expansion valve
K*R (A*P)		PCB relay
K1S	*	3-way valve
K2S		2-way valve
M1C		Compressor
M1F - M2F		Switchbox cooling fan
M1P		DC inverter pump
PC (A11P)	*	Power circuit
PHC1		Optocoupler input circuit
PS (A*P)		Switching power supply
Q1DI - Q2DI	#	Earth leakage protector
Q2L		Thermal protector water piping
R1 - R2 (A4P)		Resistance
R1L		Reactor
RC (A*P)		Receiver circuit
S1PH		High pressure switch
S1S	#	Benefit kWh rate power supply contact
S3S	#	Mixing station input 1
S4S	#	Mixing station input 2
SS1 (A1P)		Selector switch (emergency)
SS1 (A2P)		Selector switch (master slave)
SS1 (A7P)	*	Selector switch
TC (A*P)		Transmitter circuit
T1R - T2R (A*P)		Diode bridge
T3R		Power module
V1C - V8C		Ferrite core noise filter
X1M - X3M		Terminal strip
X*M (A*P)	*	Terminal strip on PCB
X1Y- X4Y		Connector
Y1R		4 way valve

Z1F - Z5F (A*P)		Noise filter

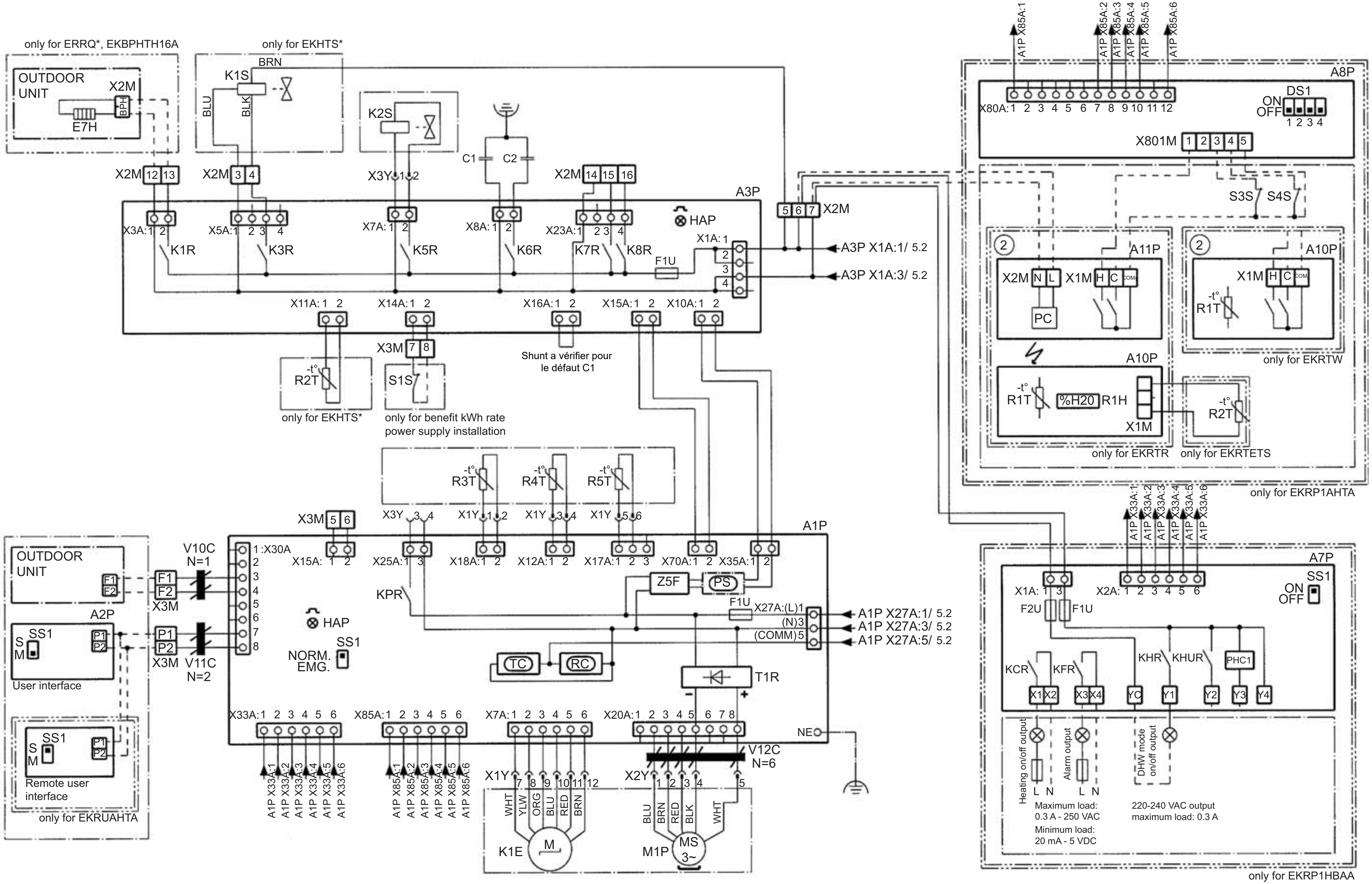
*: included in option kit

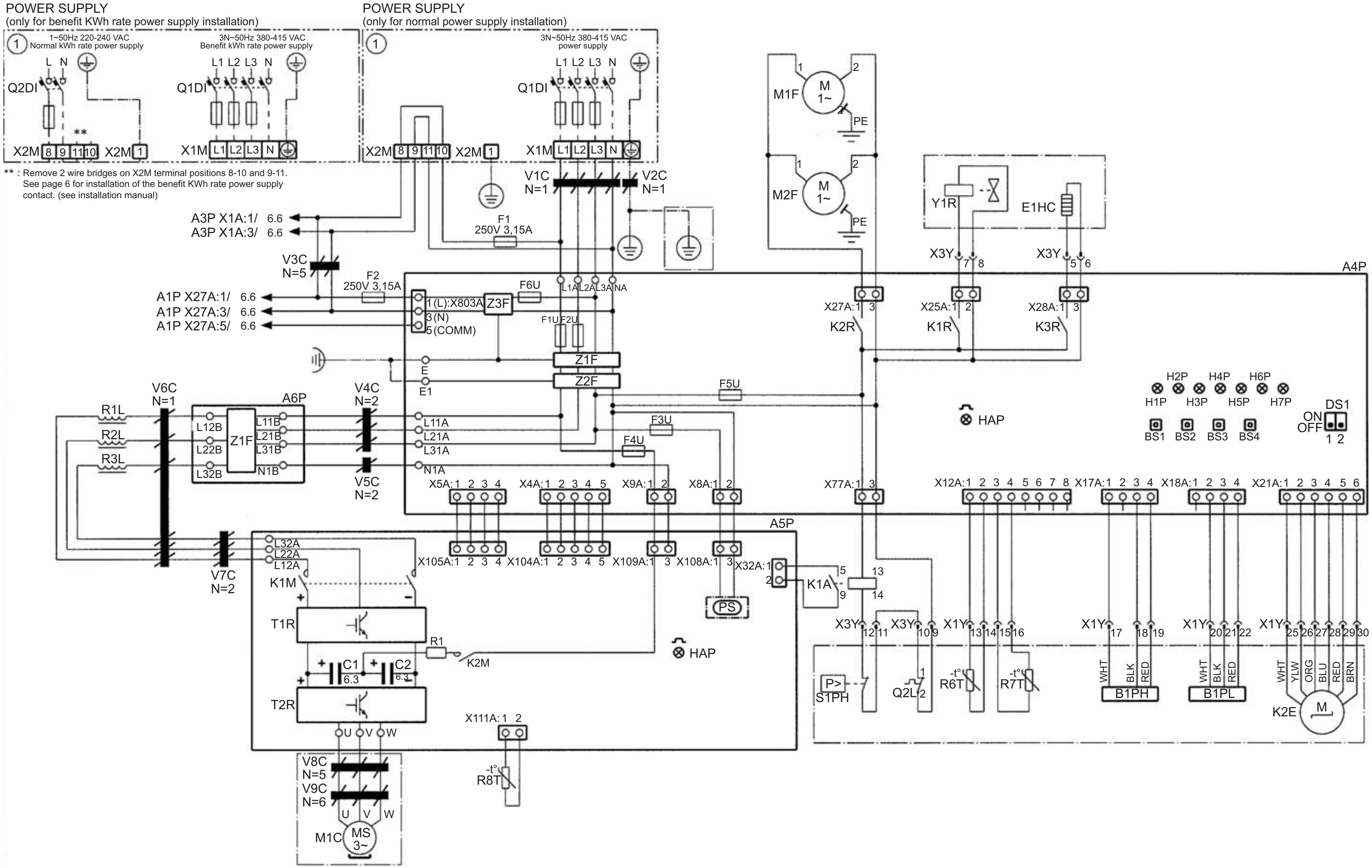
#: field supplied

Part number		Description
A1P		Main PCB
A2P		User interface PCB
A3P		Control PCB
A4P		Inverter PCB
A5P		QA PCB
A6P		Filter PCB
A7P	*	Digital I/O PCB
A8P	*	Demand PCB
A9P		Service PCB
A10P	*	Thermostat PCB
A11P	*	Receiver PCB
R1H (EKRTR)	*	Humidity sensor
R1T (EKRTW/R)	*	Ambient sensor
R2T (EKHTS*)	*	Domestic hot water tank thermistor
R2T (EKRTETS)	*	External sensor (floor or ambient)
R3T		Liquid thermistor R-410A
R4T		Returning water thermistor
R5T		Leaving water thermistor
R6T		Discharge thermistor
R7T		Liquid thermistor R-134a
R8T		Fin thermistor

*: included in option kit

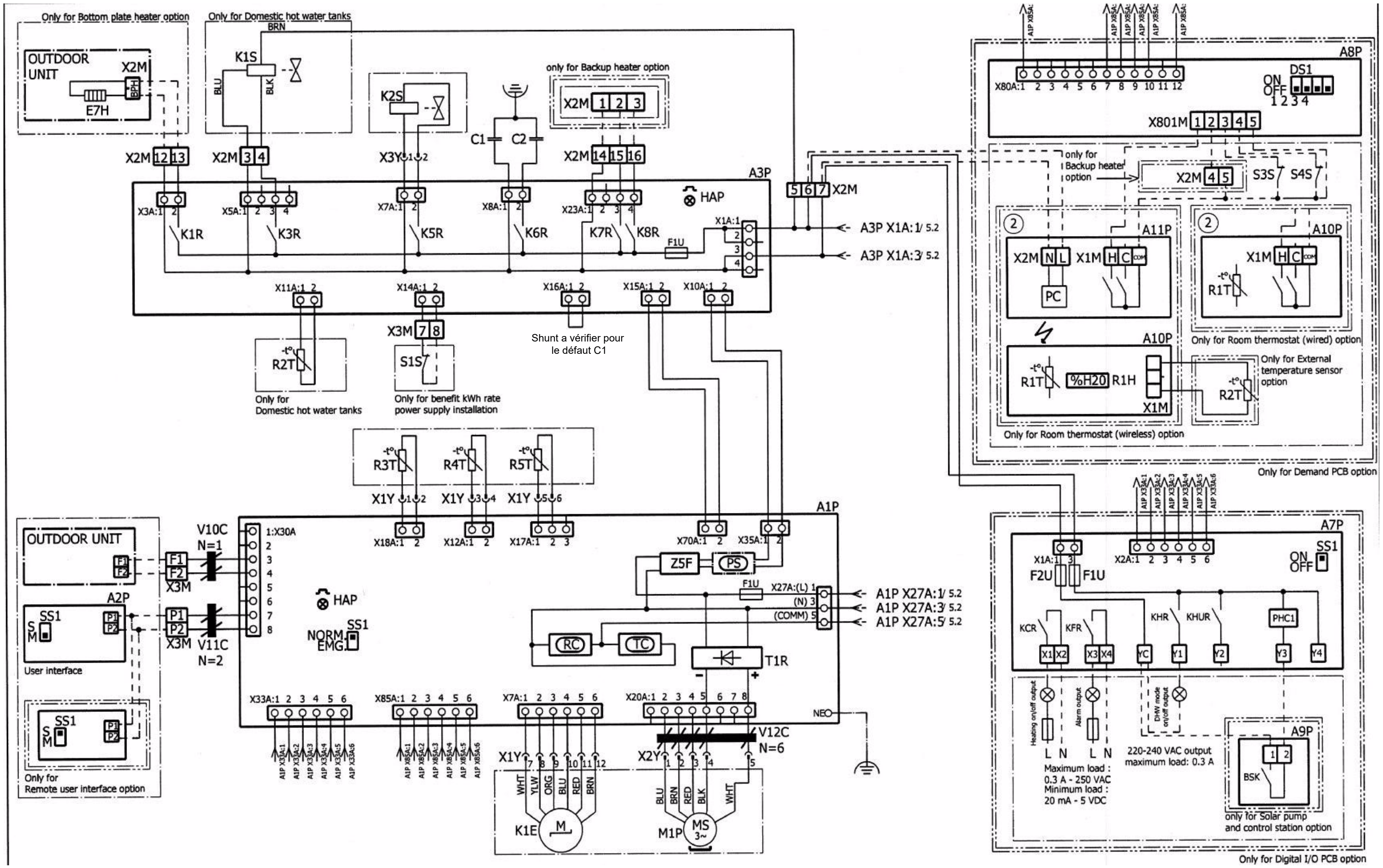
EKHBRD 011/014/016 AAY1

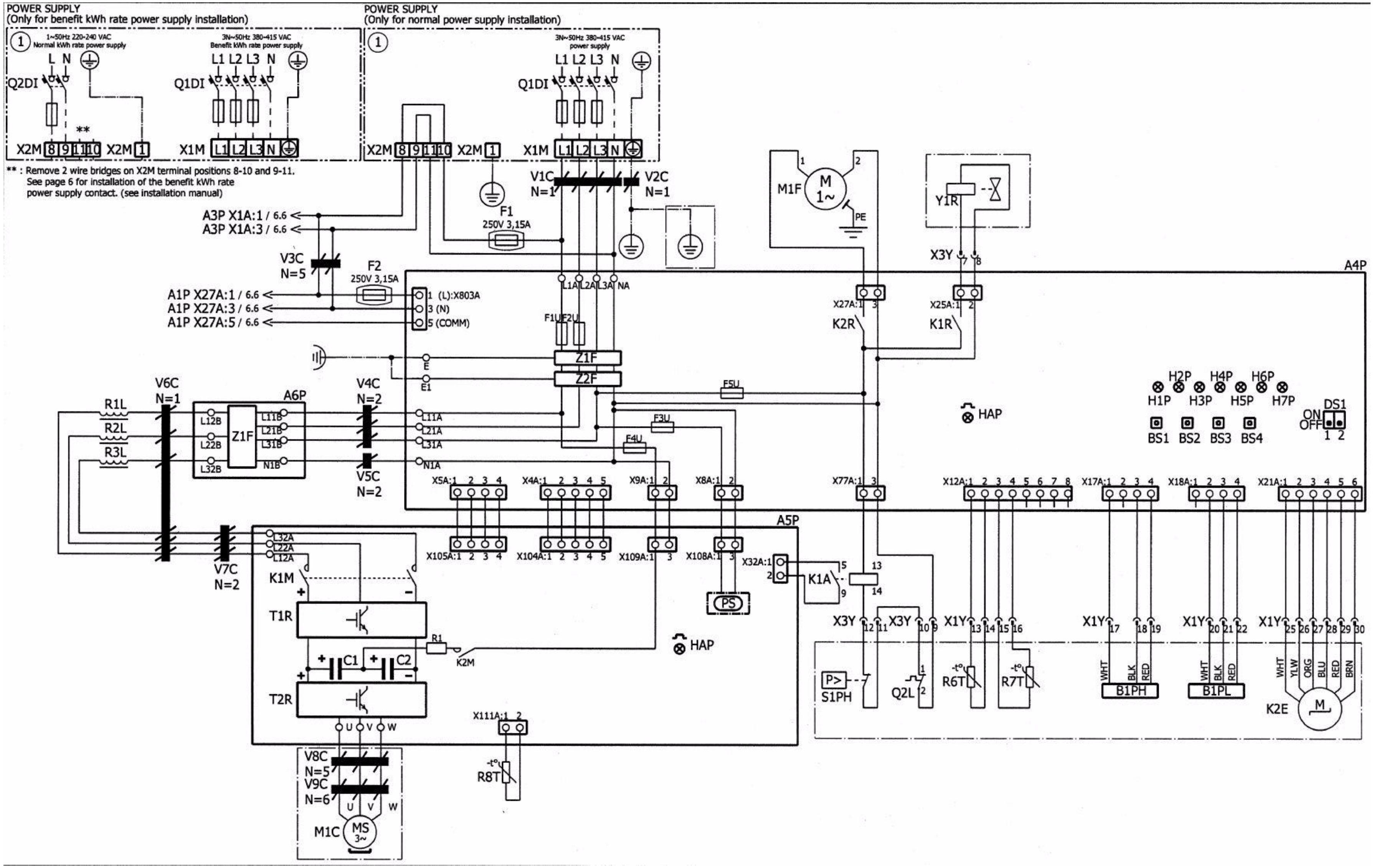




** : Remove 2 wire bridges on X2M terminal positions 8-10 and 9-11.
See page 6 for installation of the benefit KWh rate power supply contact. (see installation manual)

EKHBRD 011/014/016 AB/AC Y1




POWER SUPPLY
(Only for benefit kWh rate power supply installation)
1~50Hz 220-240 VAC
Normal kWh rate power supply
3N~50Hz 380-415 VAC
Benefit kWh rate power supply
L N
L1 L2 L3 N
Q2DI
Q1DI
**
X2M 8 9 11 10 X2M 1
X1M L1 L2 L3 N
** : Remove 2 wire bridges on X2M terminal positions 8-10 and 9-11.
See page 6 for installation of the benefit kWh rate
power supply contact. (see installation manual)
POWER SUPPLY
(Only for normal power supply installation)
3N~50Hz 380-415 VAC
power supply
V1C
N=1
V2C
N=1
F1
250V 3,15A
A3P X1A:1 / 6.6
A3P X1A:3 / 6.6
V3C
N=5
F2
250V 3,15A
A1P X27A:1 / 6.6
A1P X27A:3 / 6.6
A1P X27A:5 / 6.6
1 (L):X803A
3 (N)
5 (COMM)
L1A L2A L3A NA
F1U F2U
Z1F
Z2F
E
E1
F5U
F3U
F4U
M1F
M 1~
PE
Y1R
X3Y 7 8
A4P
X27A:1 3
K2R
X25A:1 2
K1R
H1P H2P H3P H4P H5P H6P H7P
HAP
BS1 BS2 BS3 BS4
DS1
ON
OFF
1 2
R1L
R2L
R3L
V6C
N=1
A6P
L12B
L22B
L32B
L11B
L21B
L31B
N1B
V4C
N=2
V5C
N=2
L11A
L21A
L31A
N1A
X5A:1 2 3 4
X4A:1 2 3 4 5
X9A:1 2
X8A:1 2
X77A:1 3
X12A:1 2 3 4 5 6 7 8
X17A:1 2 3 4
X18A:1 2 3 4
X21A:1 2 3 4 5 6
A5P
L32A
L22A
L12A
V7C
N=2
K1M
T1R
T2R
R1
K2M
C1
C2
X105A:1 2 3 4
X104A:1 2 3 4 5
X109A:1 3
X108A:1 3
X32A:1
2
K1A
5
9
13
14
PS
HAP
U V W
X111A:1 2
R8T
V8C
N=5
V9C
N=6
U V W
M1C
MS 3~
X3Y 12 11
X3Y 10 9
X1Y 13 14 15 16
X1Y 17 18 19
X1Y 20 21 22
X1Y 25 26 27 28 29 30
P>
S1PH
Q2L
1
2
R6T
R7T
WHT BLK RED
B1PH
WHT BLK RED
B1PL
WHT YLW ORG BLU RED BRN
K2E
M

Legend

Part number		Description
B1PH		High pressure sensor
B1PL		Low pressure sensor
BS1 - BS4 (A4P)		Push button
C1 - C2		Filter capacitor
C1 - C2 (A5P)		PCB capacitor
DS1 (A*P)		Dipswitch
E7H	*	Bottom plate heater (only in combination with ERRQ* outdoor unit or ERSQ* outdoor unit with option EKBPHTH16A)
E1HC		Crankcase heater
F1 - F2		Inline fuse
F1U (A1P, A3P)		Fuse (T, 3.15A, 250V)
F1U - F2U (A4P)		Fuse (31.5A, 500V)
F3U - F6U (A4P)		Fuse (6.3A, 250V)
F1U - F2U (A7P)	*	Fuse (5A, 250V)
H1P - H7P (A4P)		PCB LED
HAP (A*P)		PCB LED
K1A		Interface relay
K1E		Electronic expansion valve
K2E		Electronic expansion valve
K1M - K2M		PCB contactor
K*R (A*P)		PCB relay
K1S	*	3-way valve (optional)
K2S		2-way valve
M1C		Compressor
M1F - M2F		Switchbox cooling fan
M1P		DC inverter pump
PC (A11P)	*	Power circuit
PHC1		Optocoupler input circuit
PS (A*P)		Switching power supply
Q1DI - Q2DI	#	Earth leakage protector
Q2L		Thermal protector water piping
R1 (A5P)		Resistance
R1L - R3L		Reactor
RC (A*P)		Receiver circuit
S1PH		High pressure switch
S1S	#	Benefit kWh rate power supply contact
S3S	#	Mixing station input 1
S4S	#	Mixing station input 2
SS1 (A1P)		Selector switch (emergency)
SS1 (A2P)		Selector switch (master slave)
SS1 (A7P)	*	Selector switch
TC (A*P)		Transmitter circuit
T1R - T2R (A*P)		Diode bridge
V1C - V12C		Ferrite core noise filter
X1M - X3M		Terminal strip
X*M (A*P)	*	PCB terminal strip
X1Y- X4Y		Connector
Y1R		4 way valve
Z1F - Z5F (A*P)		Noise filter

*: included in option kit
#: field supplied

Part number		Description
A1P		Main PCB
A2P		User interface PCB
A3P		Control PCB
A4P		Inverter control PCB
A5P		Inverter PCB
A6P		Filter PCB
A7P	*	Digital I/O PCB (optional)
A8P	*	Demand PCB (optional)
A10P	*	Thermostat PCB (optional)
A11P	*	Receiver PCB (optional)
R1H (EKRTR)	*	Humidity sensor (optional)
R1T (EKRTW/R)	*	Ambient sensor (optional)
R2T (EKHTS*)	*	Domestic hot water tank thermistor (optional)
R2T (EKRTETS)	*	External sensor (floor or ambient) (optional)
R3T		Liquid thermistor R-410A
R4T		Returning water thermistor
R5T		Leaving water thermistor
R6T		Discharge thermistor
R7T		Liquid thermistor R-134a
R8T		Fin thermistor

*: included in option kit

3. Thermistor Resistance / Temperature Characteristics

Indoor unit	For air suction	R1T
	For liquid pipe	R2T
	For gas pipe	R3T
Outdoor unit	For outdoor air	R1T
	For suction pipe 1	R3T
	For heat exchanger	R4T, R6T
	For suction pipe 2	R5T
	For Subcooling heat exchanger outlet	R6T, R4T
	For Liquid pipe	R7T, R8T

Outdoor unit for fin thermistor	R1T

(kΩ)

TºC	0.0
-10	-
-8	-
-6	88.0
-4	79.1
-2	71.1
0	64.1
2	57.8
4	52.3
6	47.3
8	42.9
10	38.9
12	35.3
14	32.1
16	29.2
18	26.6
20	24.3
22	22.2
24	20.3
26	18.5
28	17.0
30	15.6
32	14.2
34	13.1
36	12.0
38	11.1
40	10.3
42	9.5
44	8.8
46	8.2
48	7.6
50	7.0
52	6.7
54	6.0
56	5.5
58	5.2
60	4.79
62	4.46
64	4.15
66	3.87
68	3.61
70	3.37
72	3.15
74	2.94
76	2.75
78	2.51
80	2.41
82	2.26
84	2.12
86	1.99
88	1.87
90	1.76
92	1.65
94	1.55
96	1.46
98	1.38

T°C	0.0	0.5
-20	197.81	192.08
-19	186.53	181.16
-18	175.97	170.94
-17	166.07	161.36
-16	156.80	152.38
-15	148.10	143.96
-14	139.94	136.05
-13	132.28	128.63
-12	125.09	121.66
-11	118.34	115.12
-10	111.99	108.96
-9	106.03	103.18
-8	100.41	97.73
-7	95.14	92.61
-6	90.17	87.79
-5	85.49	83.25
-4	81.08	78.97
-3	76.93	74.94
-2	73.01	71.14
-1	69.32	67.56
0	65.84	64.17
1	62.54	60.96
2	59.43	57.94
3	56.49	55.08
4	53.71	52.38
5	51.09	49.83
6	48.61	47.42
7	46.26	45.14
8	44.05	42.98
9	41.95	40.94
10	39.96	39.01
11	38.08	37.18
12	36.30	35.45
13	34.62	33.81
14	33.02	32.25
15	31.50	30.77
16	30.06	29.37
17	28.70	28.05
18	27.41	26.78
19	26.18	25.59
20	25.01	24.45
21	23.91	23.37
22	22.85	22.35
23	21.85	21.37
24	20.90	20.45
25	20.00	19.56
26	19.14	18.73
27	18.32	17.93
28	17.54	17.17
29	16.80	16.45
30	16.10	15.76

T°C	0.0	0.5
30	16.10	15.76
31	15.43	15.10
32	14.79	14.48
33	14.18	13.88
34	13.59	13.31
35	13.04	12.77
36	12.51	12.25
37	12.01	11.76
38	11.52	11.29
39	11.06	10.84
40	10.63	10.41
41	10.21	10.00
42	9.81	9.61
43	9.42	9.24
44	9.06	8.88
45	8.71	8.54
46	8.37	8.21
47	8.05	7.90
48	7.75	7.60
49	7.46	7.31
50	7.18	7.04
51	6.91	6.78
52	6.65	6.53
53	6.41	6.53
54	6.65	6.53
55	6.41	6.53
56	6.18	6.06
57	5.95	5.84
58	5.74	5.43
59	5.14	5.05
60	4.96	4.87
61	4.79	4.70
62	4.62	4.54
63	4.46	4.38
64	4.30	4.23
65	4.16	4.08
66	4.01	3.94
67	3.88	3.81
68	3.75	3.68
69	3.62	3.56
70	3.50	3.44
71	3.38	3.32
72	3.27	3.21
73	3.16	3.11
74	3.06	3.01
75	2.96	2.91
76	2.86	2.82
77	2.77	2.72
78	2.68	2.64
79	2.60	2.55
80	2.51	2.47

Outdoor Unit Thermistors for Discharge Pipe (R2T)

(kΩ)

T°C	0.0	0.5	T°C	0.0	0.5	T°C	0.0	0.5
0	640.44	624.65	50	72.32	70.96	100	13.35	13.15
1	609.31	594.43	51	69.64	68.34	101	12.95	12.76
2	579.96	565.78	52	67.06	65.82	102	12.57	12.38
3	552.00	538.63	53	64.60	63.41	103	12.20	12.01
4	525.63	512.97	54	62.24	61.09	104	11.84	11.66
5	500.66	488.67	55	59.97	58.87	105	11.49	11.32
6	477.01	465.65	56	57.80	56.75	106	11.15	10.99
7	454.60	443.84	57	55.72	54.70	107	10.83	10.67
8	433.37	423.17	58	53.72	52.84	108	10.52	10.36
9	413.24	403.57	59	51.98	50.96	109	10.21	10.06
10	394.16	384.98	60	49.96	49.06	110	9.92	9.78
11	376.05	367.35	61	48.19	47.33	111	9.64	9.50
12	358.88	350.62	62	46.49	45.67	112	9.36	9.23
13	342.58	334.74	63	44.86	44.07	113	9.10	8.97
14	327.10	319.66	64	43.30	42.54	114	8.84	8.71
15	312.41	305.33	65	41.79	41.06	115	8.59	8.47
16	298.45	291.73	66	40.35	39.65	116	8.35	8.23
17	285.18	278.80	67	38.96	38.29	117	8.12	8.01
18	272.58	266.51	68	37.63	36.98	118	7.89	7.78
19	260.60	254.72	69	36.34	35.72	119	7.68	7.57
20	249.00	243.61	70	35.11	34.51	120	7.47	7.36
21	238.36	233.14	71	33.92	33.35	121	7.26	7.16
22	228.05	223.08	72	32.78	32.23	122	7.06	6.97
23	218.24	213.51	73	31.69	31.15	123	6.87	6.78
24	208.90	204.39	74	30.63	30.12	124	6.69	6.59
25	200.00	195.71	75	29.61	29.12	125	6.51	6.42
26	191.53	187.44	76	28.64	28.16	126	6.33	6.25
27	183.46	179.57	77	27.69	27.24	127	6.16	6.08
28	175.77	172.06	78	26.79	26.35	128	6.00	5.92
29	168.44	164.90	79	25.91	25.49	129	5.84	5.76
30	161.45	158.08	80	25.07	24.66	130	5.69	5.61
31	154.79	151.57	81	24.26	23.87	131	5.54	5.46
32	148.43	145.37	82	23.48	23.10	132	5.39	5.32
33	142.37	139.44	83	22.73	22.36	133	5.25	5.18
34	136.59	133.79	84	22.01	21.65	134	5.12	5.05
35	131.06	128.39	85	21.31	20.97	135	4.98	4.92
36	125.79	123.24	86	20.63	20.31	136	4.86	4.79
37	120.76	118.32	87	19.98	19.67	137	4.73	4.67
38	115.95	113.62	88	19.36	19.05	138	4.61	4.55
39	111.35	109.13	89	18.75	18.46	139	4.49	4.44
40	106.96	104.84	90	18.17	17.89	140	4.38	4.32
41	102.76	100.73	91	17.61	17.34	141	4.27	4.22
42	98.75	96.81	92	17.07	16.80	142	4.16	4.11
43	94.92	93.06	93	16.54	16.29	143	4.06	4.01
44	91.25	89.47	94	16.04	15.79	144	3.96	3.91
45	87.74	86.04	95	15.55	15.31	145	3.86	3.81
46	84.38	82.75	96	15.08	14.85	146	3.76	3.72
47	81.16	79.61	97	14.62	14.40	147	3.67	3.62
48	78.09	76.60	98	14.18	13.97	148	3.58	3.54
49	75.14	73.71	99	13.76	13.55	149	3.49	3.45
50	72.32	70.96	100	13.35	13.15	150	3.41	3.37

Tank Thermistor (R2T)

NTC-curve

T°C	Resistance value
-20	197.81 kΩ
0	65.84 kΩ
25	20 kΩ

4. Pressure Sensor

$P_H = 1.38V-0.69$

$P_L = 0.57V-0.28$

P_H : High pressure (MPa)

V_L : Low pressure (MPa)

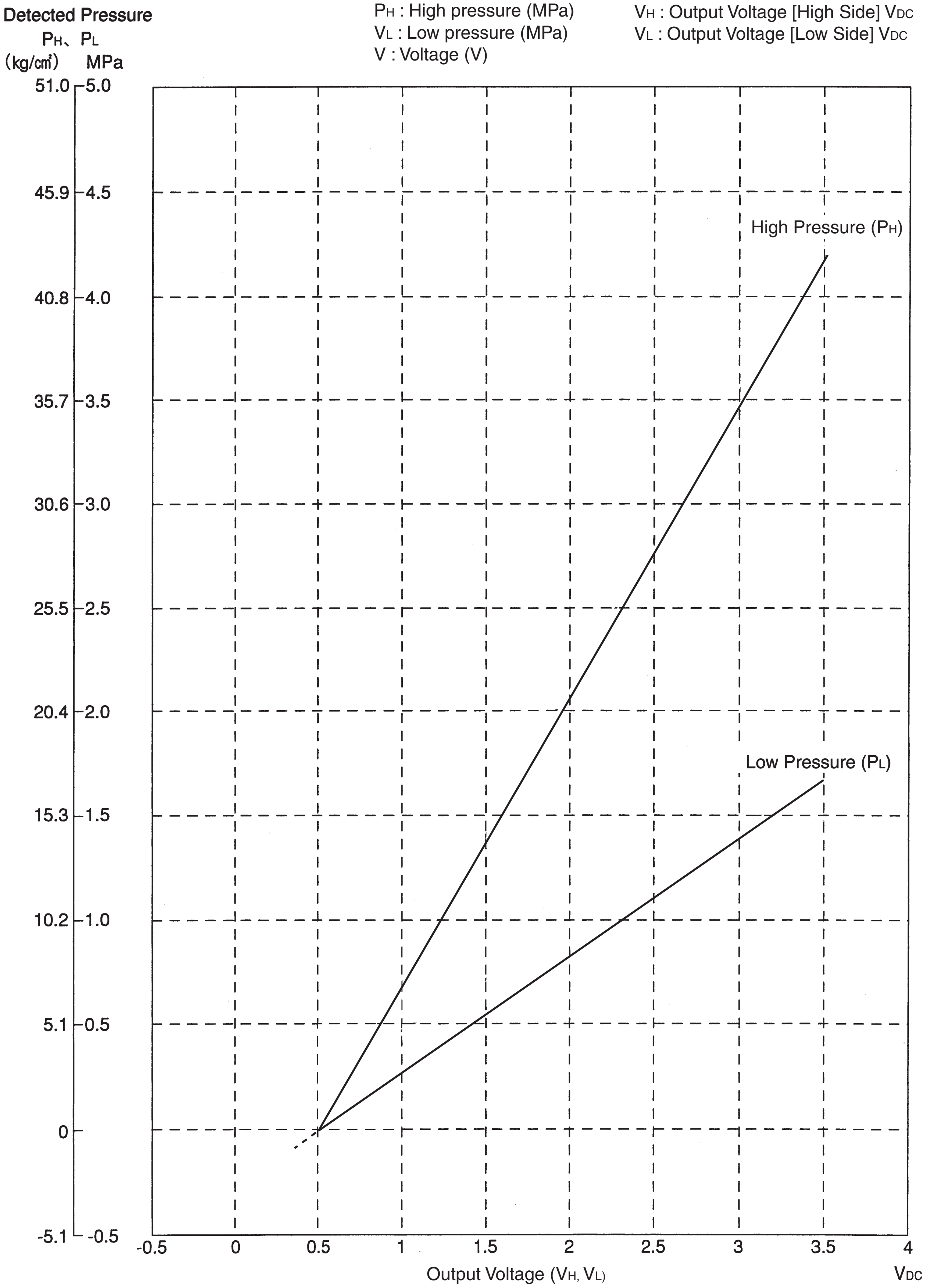
V : Voltage (V)

P_H : Detected Pressure [High Side] MPa

P_L : Detected Pressure [Low Side] MPa

V_H : Output Voltage [High Side] V_{DC}

V_L : Output Voltage [Low Side] V_{DC}



(V3053)

5. Method of Replacing the Inverter’s Power Transistors Modules

⚠**Warning**: CAPACITOR SHOCK HAZARD. The capacitors (top surfaces) can hold up to 220V. Use correct precautions when servicing.

Checking failures in power semiconductors mounted on inverter PC board

Check the power semiconductors mounted on the inverter PC board by the use of a multiple tester.

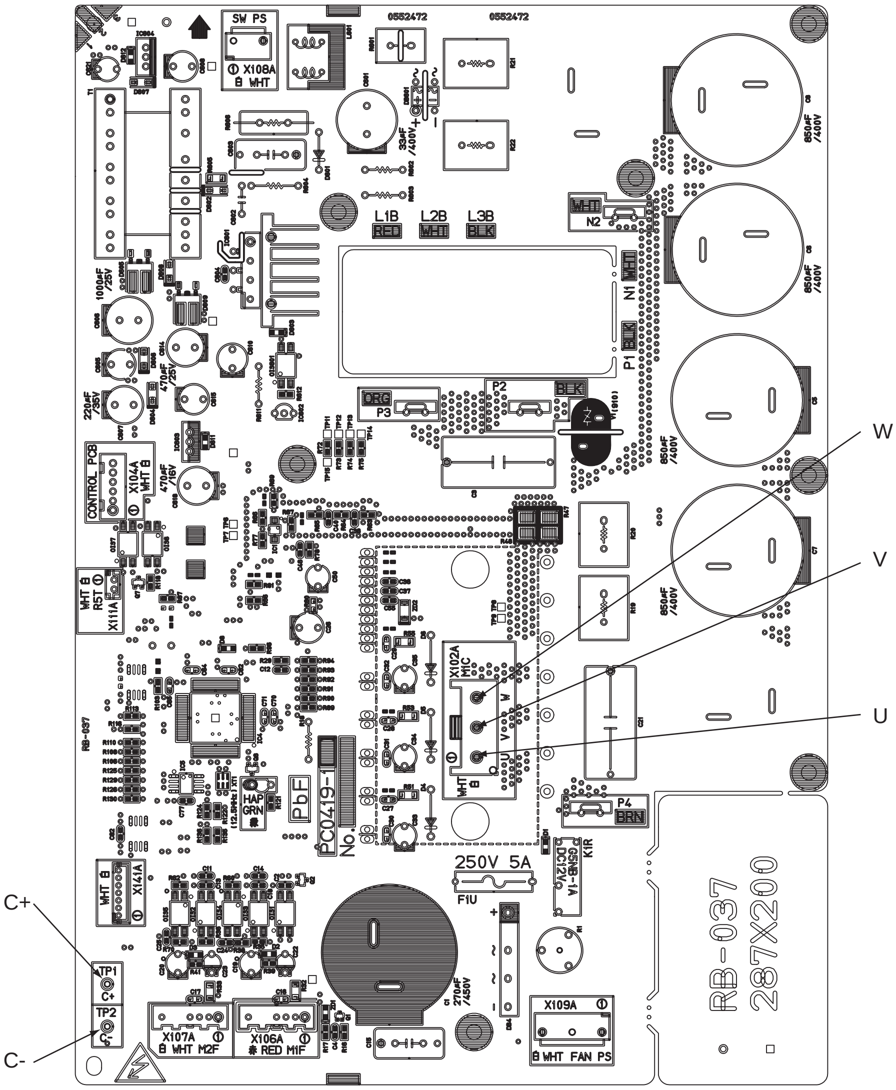
<Items to be prepared>

- Multiple tester : Prepare the digital type of multiple tester with diode check function.

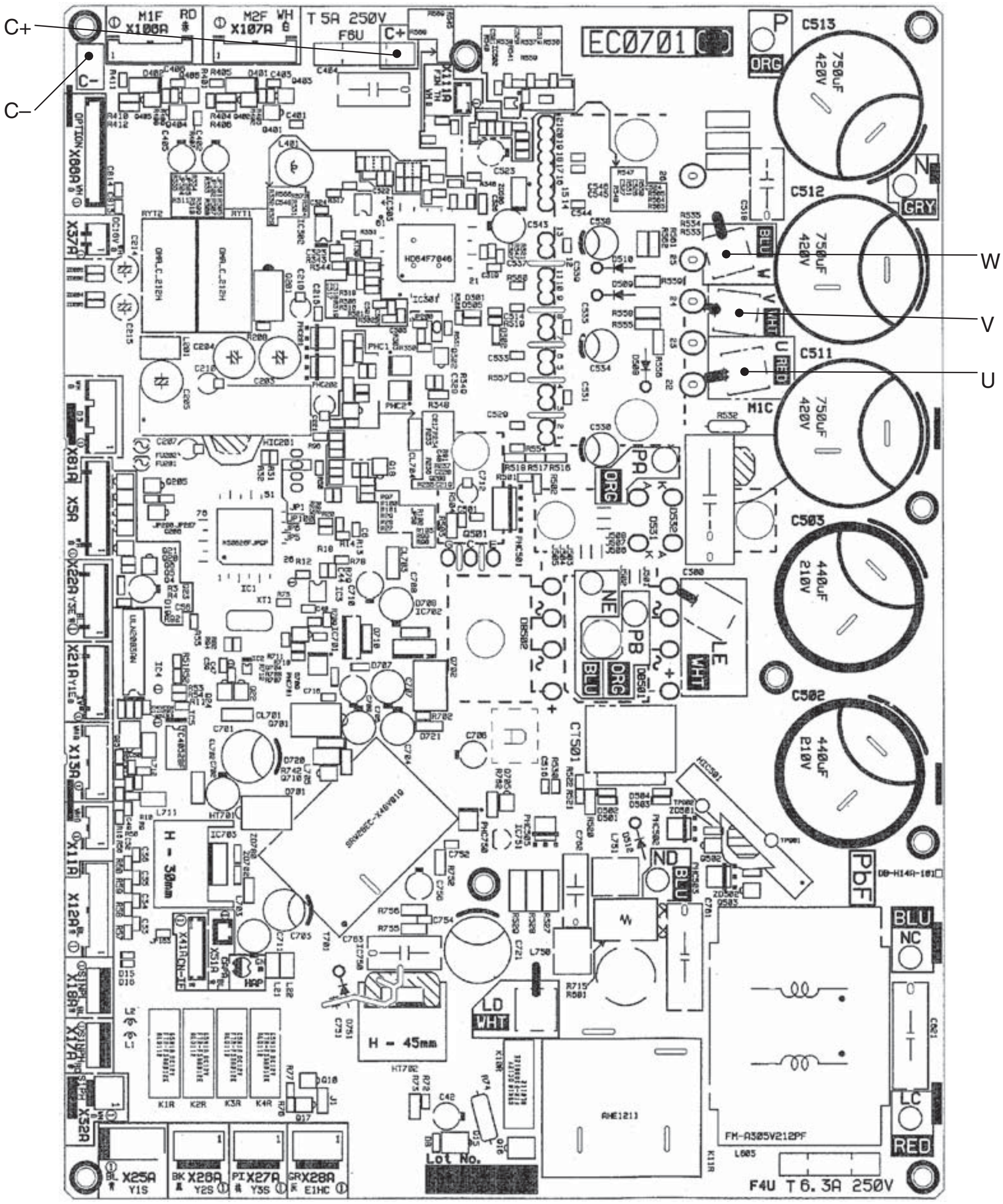
<Preparation>

- Turn OFF the power supply. Then, after a lapse of 10 minutes or more, make measurement of resistance.
- To make measurement, disconnect all connectors and terminals.

Inverter PC board



Inverter PC board



Power module checking

When using the digital type of multiple tester, make measurement in diode check mode.

Tester terminal		Criterion	Remark
+	-		
C+	U	Not less than 0.3V (including ∞)*	It may take time to determine the voltage due to capacitor charge or else.
	V		
	W		
U	C-	Not less than 0.3V (including ∞)*	
V			
W			
U	C+	0.3 to 0.7V (including ∞)*	
V			
W			
C-	U	0.3 to 0.7V (including ∞)*	
	V		
	W		

*There needs to be none of each value variation.

The following abnormalities are also doubted besides the PC board abnormality.

- Faulty compressor (ground fault, ground leakage)
- Faulty fan motor (ground leakage)

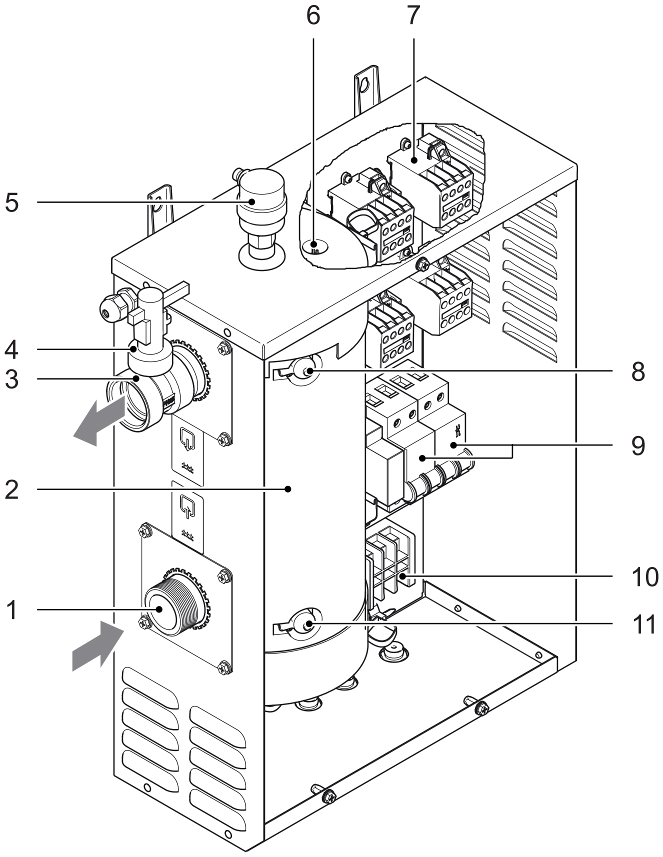
6. External Backup Heater Kit

6.1 Model Name

Model Name
EKBUHAA6V3
EKBUHAA6W1

6.2 Main Components

Bird's-eye view



Legend

No.	Name
1	Water IN connection
2	Heater (E*H)
3	Water OUT connection
4	Flow switch (S1L)
5	Air purge
6	Thermal fuse >122°C (F1T)
7	Contactors (K*M)
8	Thermal protector - manual reset >92°C (Q1L)
9	Overcurrent fuse (F*B)
10	Electrical connections (X*M)
11	Thermal protector - self reset >75°C (Q2L)
⇨	Flow direction

Safety devices

Caution The heater kit air purge connection may not be used for other purposes.

- Thermal protector — The heater in the heater kit is equipped with a thermal protector (activation temperature 92°C). The thermal protector is activated when the temperature becomes too high. When activated, the protector has to be reset on the heater of the heater kit by pressing the white button (for access, remove the cover of the kit).

Caution

- The electrical box lid must only be opened by a licensed electrician.
- Switch off the power supply before opening the electrical box lid.

- Pressure relief valve — In case valves are installed between the indoor unit and the heater kit and between the outlet and the load, a pressure relief valve (field supply) in accordance with relevant local laws and regulations, and with an opening pressure of maximum 3 bar must be installed on the water inlet of the heater kit.

6.3 Technical Specifications

				V3	W1
Heater capacity	Step 1		(kW)	3	2
	Step 2		(kW)	6	6
Dimensions H x W x D			(mm)	575 x 415 x 170	
Weight			(kg)	12	
Connections	Water inlet			G 1"1/4 (male)	
	Water outlet			G 1"1/4 (female)	
Maximum water pressure			(bar)	3	
Power supply	Phase			1~	3N~
	Frequency		(Hz)	50	
	Voltage range	Minimum	(V)	220	380
		Maximum	(V)	240	415
	Voltage tolerance			–10%/+6%	
	Maximum running current		(A)	26.1	8.7
	Recommended field fuse		(A)	32	16

6.4 Detailed Explanation of Setting Modes

To activate the heater kit some field settings on the indoor unit need to be changed. For details how to change field settings refer to the chapter "Field settings" of the indoor unit installation or operation manual.

Detailed description

- **[6-02] Heater kit**
  Once installed, you can activate the heater kit by changing field setting [6-02]=1. From that moment on, the heat pump system will take the heater kit into account whilst deciding operation. When the heater is actually operating, the heater symbol is shown on the remote controller. There is no step 1-2 indication.

Use of backup heater with EKHBRD*AA*

		[6-02]=0	[6-02]=1	
Normal heat pump operation	BUH assistance possible	NO	YES	
During heat pump tariff	BUH operation	NO	YES	(*)
	Heat pump operation	NO	NO	
Ta < -25°C	Automatic switch over to BUH operation	NO	NO	

(*) Auxilary relay (following heat pump tariff signal) can be applied to switch off BUH during HP tariff operation

Use of backup heater with EKHBRD*AB*/EKHVMY(R)D*AA*

		[6-02]=0		[6-02]=1		
		[8-01]=0	[8-01]=1	[8-01]=0	[8-01]=1	
Normal heat pump operation	BUH assistance possible	NO	NO	YES	YES	
During heat pump tariff	BUH operation	NO	NO	NO	YES	
	Heat pump operation	NO	NO	NO	NO	
Ta < -25°C	Automatic switch over to BUH operation	NO	NO	NO	YES	(*)

(*) Auxilary relay (following heat pump tariff signal) can be applied to switch off BUH during HP tariff operation

Note Setting [8-01]:
Not for EKHBRD*AA*: was used to set auto restart on or off. This has been changed to default on.

- **[8-02] Emergency operation**
  During emergency mode, heating is only done by the heater kit, not by the heat pump. Activation of emergency mode is done by changing field setting [8-02]=1. Activating the emergency mode will stop the heat pump operation. The pump of the indoor unit will be started, but heating itself is done by the heater kit. If there are no error conditions in leaving or returning water thermistors, the heater kit can start to follow emergency operation.

Note Before activating emergency operation, be sure to activate the heater kit. The heater will stay in emergency mode until the field setting is set back to default [8-02]=0.

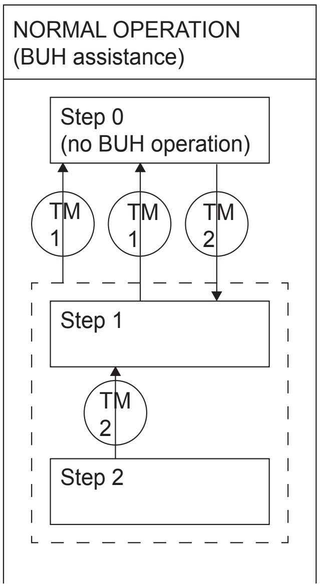
- **Benefit kWh rate power supply mode**

Note This concerns the benefit kWh rate power supply mode of the EKHBRD/EKHVM indoor unit. For more details, refer to the "Field settings" chapter of the indoor unit installation manual.

If the benefit kWh rate power supply is used for the indoor unit, the indoor unit will go into emergency operation automatically when the power supply is interrupted.

6.5 External Backup Heater Control

Normal operation



Note

- **Timer during normal operation**

The TM* indicate timers, these start counting down if they are crossed when going from one step over to another step.
TM1: 5 minutes
TM2: 10 minutes

- **BUH operation after defrost if already active before**

Timer: 10 minutes
Compressor operation: 5 minutes & high frequency

Step 0 -> Step 1

&
- 20 minutes compressor operation
- Compressor runs on high frequency
- Pump speed > ~2500 rpm (with E-03 set to default 1)
- LWT > ~ LWT setpoint - 8 (*)
- LWT < ~ LWT setpoint - 4 (*)
- If controller room thermostat function: RT<RT setpoint - 2 (normal heat load)

Step 1 / 2 -> Step 0

or
- Q2L = OFF
- DHW operation
- LWT > LWT setpoint + 2
- If room thermostat function: RT > RT setpoint

Step 1 -> Step 0

- LWT > LWT setpoint

Step 1 -> Step 2

&
- TM2 up
- LWT < ~ LWT setpoint - 6 (*)
- RWT < ~ LWT setpoint - 10 (*)

Step 2 -> Step 1

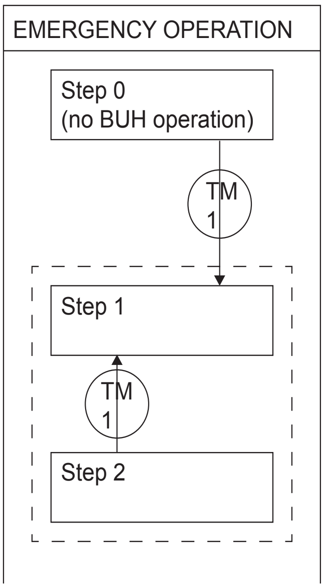
or
- LWT > ~ LWT setpoint - 2,5 (*)
- RWT > ~ LWT setpoint - 6 (*)

Step 0 -> Step 2

&
- 20 minutes compressor operation
- Compressor runs on high frequency
- Pump speed > ~2500 rpm (with E-03 set to default 1)
- LWT < ~ LWT setpoint - 8 (*)

(*): approximate value (depends on operation conditions (e.g. dT, HP indoor unit))

Emergency operation



Note

The TM* indicate timers, these start counting down if they are crossed when going from one step over to another step.
TM1: 5 minutes

Step 0 -> Step 1

&
- Q2L = ON
- LWT < ~ LWT setpoint - 15 (*)
- LWT < 55°C
- Heat request

Step 1 -> Step 2

&
- LWT < ~ LWT setpoint - 12 (*)
- LWT < 55°C
- TM1 up (5 minutes)

Step 2 -> Step 1

or
- LWT > ~ LWT setpoint - 6,5 (*)
- LWT > 65°C

Step 1 / 2 -> Step 0

&
- Q2L = OFF
- LWT > 70°C
- LWT > ~ LWT setpoint - 3,5 (*)
- No heat request

(*): approximate value (depends on operation conditions (e.g. dT, HP indoor unit))

Internal starting conditions

Request -> Operation

&
- Safe guards not operated
- Flow at least 5 seconds at 9l/min
- Entering water temperature < 75°C

Defrost heat pump operation

6.6 Troubleshooting by Indication on the Remote Controller

Remote control display

AA

Subcode 0

Applicable models

All indoor models

Method of malfunction detection

Malfunction detection is carried out by safety contacts in the heater kit

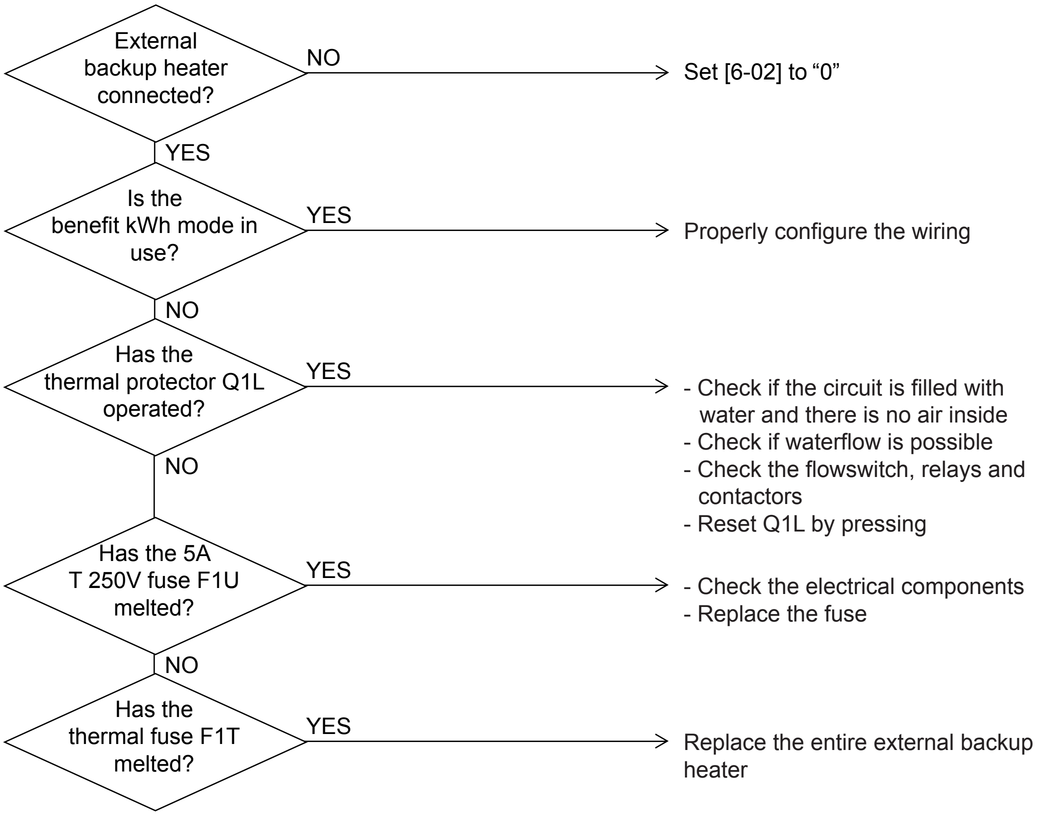
Malfunction decision conditions

Supposed causes

- Heater kit thermal protector (Q2L, activation temperature: 92°C) or thermal fuse (F1T, activation temperature: 122°C) error
- Heater kit connected to benefit kWh rate power supply and wrongly configured
- No heater kit installed

Troubleshooting

⚠ Caution Be sure to turn off power switch before connecting or disconnecting connector, otherwise parts may be damaged.


External backup heater connected?
NO
Set [6-02] to “0”
YES
Is the benefit kWh mode in use?
YES
Properly configure the wiring
NO
Has the thermal protector Q1L operated?
YES
- Check if the circuit is filled with water and there is no air inside
- Check if waterflow is possible
- Check the flowswitch, relays and contactors
- Reset Q1L by pressing
NO
Has the 5A T 250V fuse F1U melted?
YES
- Check the electrical components
- Replace the fuse
NO
Has the thermal fuse F1T melted?
YES
Replace the entire external backup heater

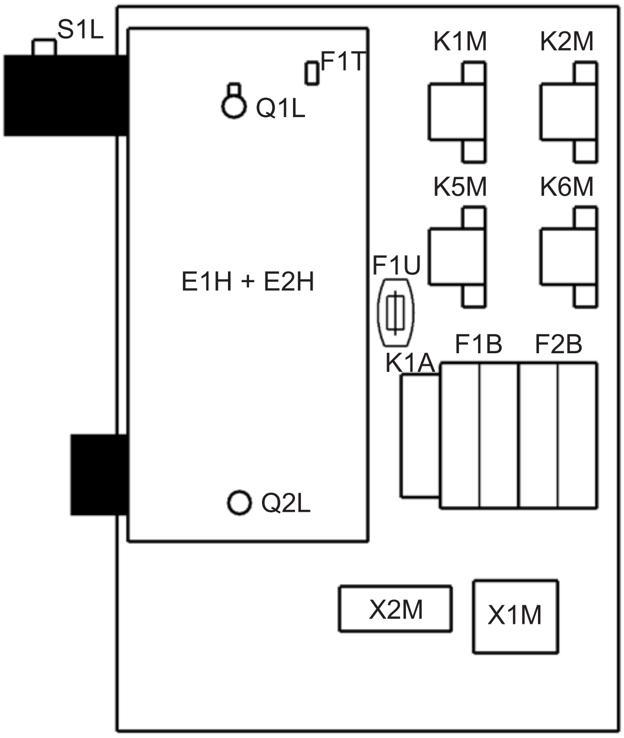
6.7 Troubleshooting: General Symptoms

General heating capacity shortage (but no AA error indication)

Possible causes	Corrective action
■ **BUH not operating: No symbol visible on the remote controller)**	
The heater kit is not activated.	Check that the “heater kit operation status” field setting [6-02] is turned on (1).
Operation conditions are not fullfilled	Check if system has low ESP. Pump speed can be too low due to low ESP (<~2500 rpm). Change minimum required pump speed by changing E-03 to “0”.
■ **BUH not operating: Symbol visible on the remote controller**	
There is not enough water flow.	Check K1A-relay. Upper light green indicates the relay is powered and that flow > 9l/min. Check for water blockage in the system and filters.
There is air in the system.	Check K1A-relay. If flow is > 9 l/min for > 5 seconds consecutive, lower orange light lights up and enables BUH operation. If lower orange light does not light up, purge the air out of the system.
Broken contactor.	Check contactors and relays by use of an ohmmeter.

6.8 Switch Box Layout

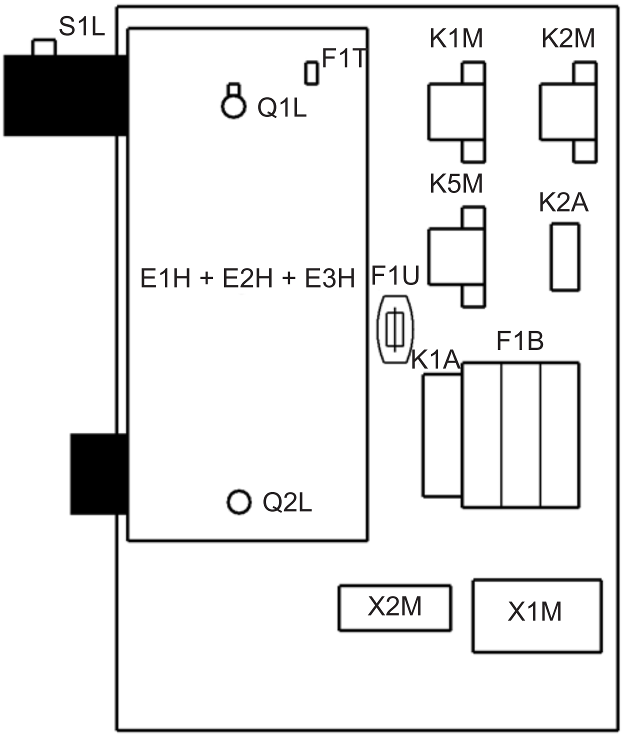
EKBUHAA6V3



Legend

Part number		Description
E1H, E2H		Backup heater elements
F1B, F2B		Fuse backup heater (20A 400V)
F1U		Fuse (5A T 250V)
F1T		Thermal fuse backup heater
K1A		Time relay (on-delay)
K1M, K2M		Contactor backup heater step
K5M, K6M		Contactor for backup heater (all pole disconnection)
S1L		Flowswitch
Q1L		Thermal protector backup heater (manual reset)
Q2L		Thermal protector inlet water (automatic reset)
X1M, X2M		Terminal strip

EKBUHAA6W1

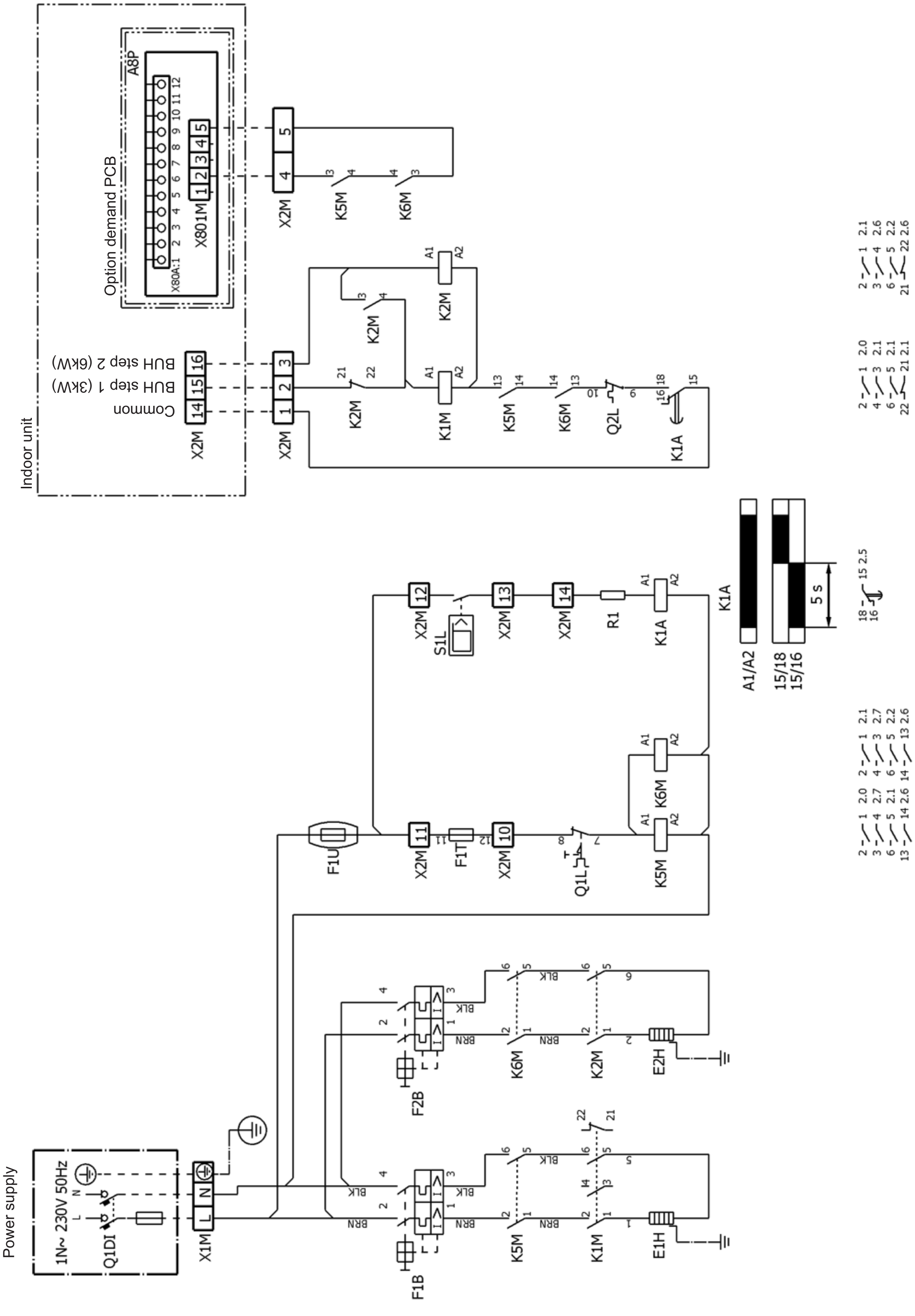


Legend

Part number		Description
E1H, E2H, E3H		Backup heater elements
F1B		Fuse backup heater (20A 400V)
F1U		Fuse (5A T 250V)
F1T		Thermal fuse backup heater
K1A		Time relay (on-delay)
K2A		Auxilary relay
K1M, K2M		Contactor backup heater step
K5M		Contactor for backup heater (all pole disconnection)
S1L		Flowswitch
Q1L		Thermal protector backup heater (manual reset)
Q2L		Thermal protector inlet water (automatic reset)
X1M, X2M		Terminal strip

6.9 Wiring Diagrams

EKBUHAA6V3

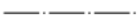
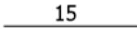
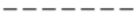
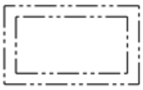
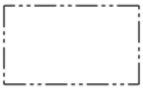
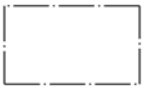


Legend

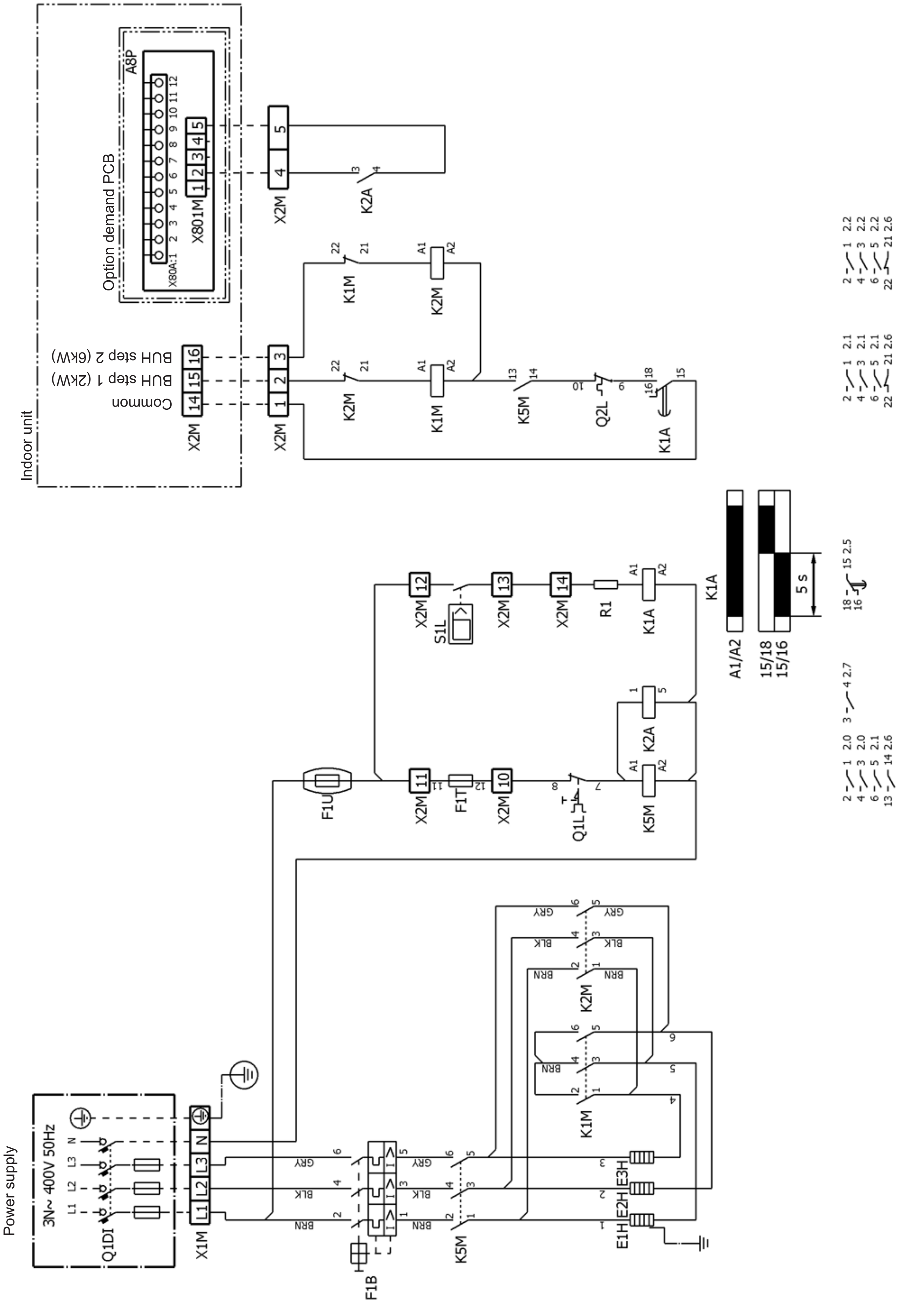
Part number		Description
A8P		Demand PCB (Indoor unit option)
E1H, E2H		Backup heater elements
F1B, F2B		Fuse backup heater (20A 400V)
F1U		Fuse (5A T 250V)
F1T		Thermal fuse backup heater
K1A		Time relay (on-delay)
K1M, K2M		Contactor backup heater step
K5M, K6M		Contactor for backup heater (all pole disconnection)
S1L		Flowswitch
Q1DI	#	Earth leakage protector
Q1L		Thermal protector backup heater (manual reset)
Q2L		Thermal protector inlet water (automatic reset)
R1		Inline resistor for flowswitch
X1M, X2M		Terminal strip
X801M		PCB terminal strip

#: field supplied

Notes

1.	X1M	Main terminal
2.	X2M	Field wiring terminal
3.		Earth wiring
4.		Wire number 15
5.		Field supply
6.		Several wiring possibilities
7.		Option
8.		Wiring depending on model
9.		Not mounted in switch box
10.		PCB

EKBUHAA6W1

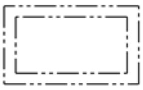
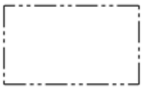
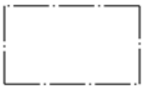

Indoor unit
Option demand PCB
A8P
X80A:1 2 3 4 5 6 7 8 9 10 11 12
X801M 1 2 3 4 5
X2M 14 15 16
Common
BUH step 1 (2kW)
BUH step 2 (6kW)
X2M 1 2 3 4 5
K2A
K1M
K2M
K5M
Q2L
K1A
X2M 10 11 12 13 14
S1L
R1
F1U
F1T
Q1L
A1/A2
15/18
15/16
5 s
Power supply
3N~ 400V 50Hz
Q1DI
L1 L2 L3 N
X1M
F1B
GRY
BLK
BRN
E1H
E2H
E3H

Legend

Part number		Description
A8P		Demand PCB (Indoor unit option)
E1H, E2H, E3H		Backup heater elements
F1B		Fuse backup heater (20A 400V)
F1U		Fuse (5A T 250V)
F1T		Thermal fuse backup heater
K1A		Time relay (on-delay)
K2A		Auxilary relay
K1M, K2M		Contactor backup heater step
K5M		Contactor for backup heater (all pole disconnection)
S1L		Flowswitch
Q1DI	#	Earth leakage protector
Q1L		Thermal protector backup heater (manual reset)
Q2L		Thermal protector inlet water (automatic reset)
R1		Inline resistor for flowswitch
X1M, X2M		Terminal strip
X801M		PCB terminal strip

#: field supplied

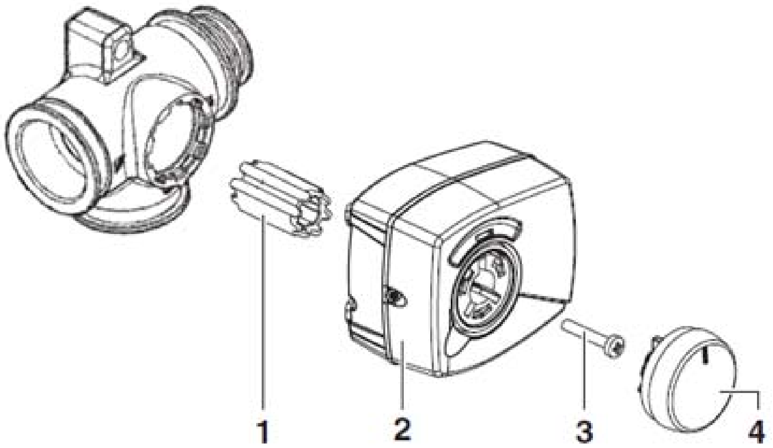
Notes

1.	X1M	Main terminal
2.	X2M	Field wiring terminal
3.	—·—·—	Earth wiring
4.	15	Wire number 15
5.	– – – – – – –	Field supply
6.	①	Several wiring possibilities
7.		Option
8.		Wiring depending on model
9.		Not mounted in switch box
10.		PCB

7. 3-Way Valve

7.1 Build-Up of 3-Way Valve

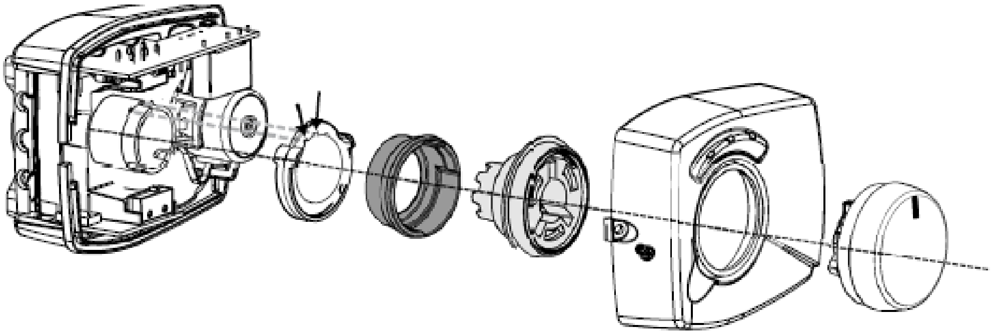
Total assembly



Legend

No.	Name
1	Sleeve
2	Valve motor cover
3	Screw
4	Turn knob

Actuator assembly



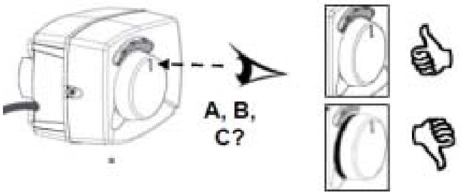
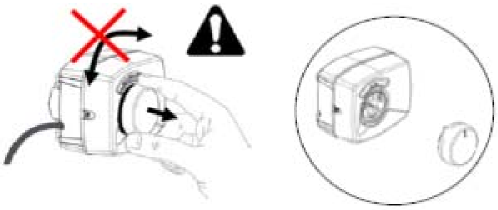
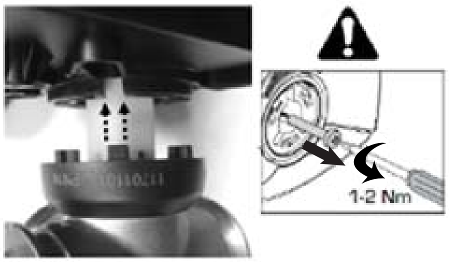
7.2 Troubleshooting Overview 3-Way Valve

Symptom	Possible cause	Check
Space heating circuit temperature rises when unit is operating in DHW. DHW temperature rises when unit is operating in space heating.	The 3-way valve sleeve is not positioned correctly.	Verify if 3-way valve motor and body are installed correctly (see page 276).
Unit is working in space heating mode but 3-way valve is positioned in DHW mode (right instead of left position). Unit is working in DHW mode but 3-way valve is positioned in space heating mode (left instead of right position).	The 3-way valve motor is incorrectly wired to the indoor unit. Jumpers settings on the 3-way valve motor PCB are incorrect.	Verify if 3-way valve motor is wired and set up correctly (see page 276).
3-way valve motor does not turn.	The 3-way valve motor is incorrectly wired to the indoor unit. The indoor main PCB is broken. The 3-way valve motor is broken.	Verify if 3-way valve motor is wired and set up correctly (see page 276). Verify if the hydrobox sends out the right signal to the 3-way valve (see page 277).

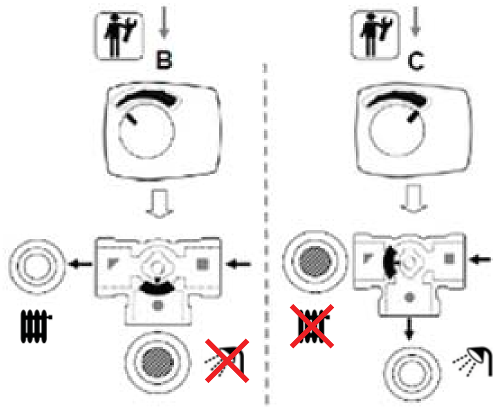
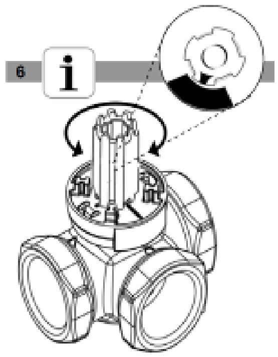
7.3 How to Verify If 3-Way Valve is Installed Correctly

Caution Switch off power before working on the unit but make sure the valve motor is not moving.

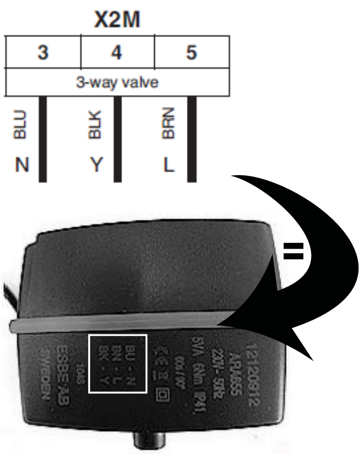
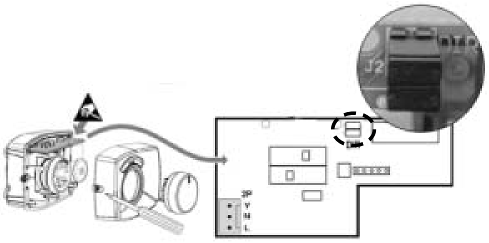
Separate the 3-way valve motor from the body

1. Check the installed motor position. A. Middle position (= factory position, in case no power has been applied to the valve yet) B. Left position (= space heating) C. Right position (= domestic hot water) Be sure the knob is pushed in completely.	
2. Remove the knob without changing the position.	
3. Unscrew the motor from the body. Watch out for not losing the screw.	

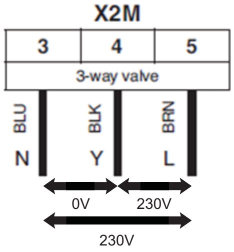
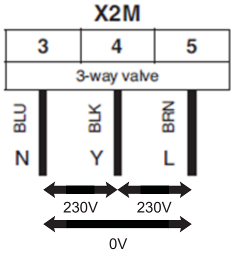
Check if 3-way valve motor is installed correctly on to the 3-way valve body

1. Check the body position by checking the groove location of the white sleeve (the groove location indicates the closed part of the body).	
2. Check if the body position matches with the motor position, and correct if necessary by turning the white sleeve to by hand.	

Check correct wiring and set up of the 3-way valve motor

1. Check if the 3-way valve is connected correctly to X2M. Verify that the color code of the N-Y-L wiring at the X2M terminal corresponds with the color code combination mentioned on the 3-way valve motor and if necessary adjust wiring accordingly.	 X2M 3 4 5 3-way valve N BLU Y BLK L BRN = 12120912 ARA655 230V~ 50Hz 5VA 6Nm IP41 BU - N BN - L BK - Y ESBE AB SWEDEN
2. Remove the cover of the motor to have access to the PCB. Check the position of the jumpers, they should be positioned horizontally. If necessary adjust position.	

Check if signal towards 3-way valve is correct

1. Disconnect 3-way valve wiring from terminal X2M:2-3-4. Check with a voltmeter if the voltages on X2M:3-4-5 correspond with reference value in different operation modes. If not, replace main PCB A1P. 2. If wiring is correct and output voltages of X2M are correct but motor does not turn when switching from one operation mode to another, replace 3-way valve motor.	In space heating mode:  X2M 3 4 5 3-way valve BLU BLK BRN N Y L 0V 230V 230V X2M: 3-4: 0V, X2M: 3-5: 230V, X2M: 4-5: 230V In DHW mode:  X2M 3 4 5 3-way valve BLU BLK BRN N Y L 230V 230V 0V X2M: 3-4: 230V, X2M: 3-5: 230V, X2M: 4-5: 0V

Part 9 - Precautions for New Refrigerant (R-410A)

1. Precautions for New Refrigerant (R-410A) 272
    - 1.1 Outline 272
    - 1.2 Refrigerant Cylinders... 274
    - 1.3 Service Tools 275

1. Precautions for New Refrigerant (R-410A)

1.1 Outline

1.1.1 About Refrigerant R-410A

- Characteristics of new refrigerant, R-410A

1. Performance
   Almost the same performance as R-22 and R-407C
2. Pressure
   Working pressure is approx. 1.4 times more than R-22 and R-407C.
3. Refrigerant composition
   Few problems in composition control, since it is a Quasi-azeotropic mixture refrigerant.

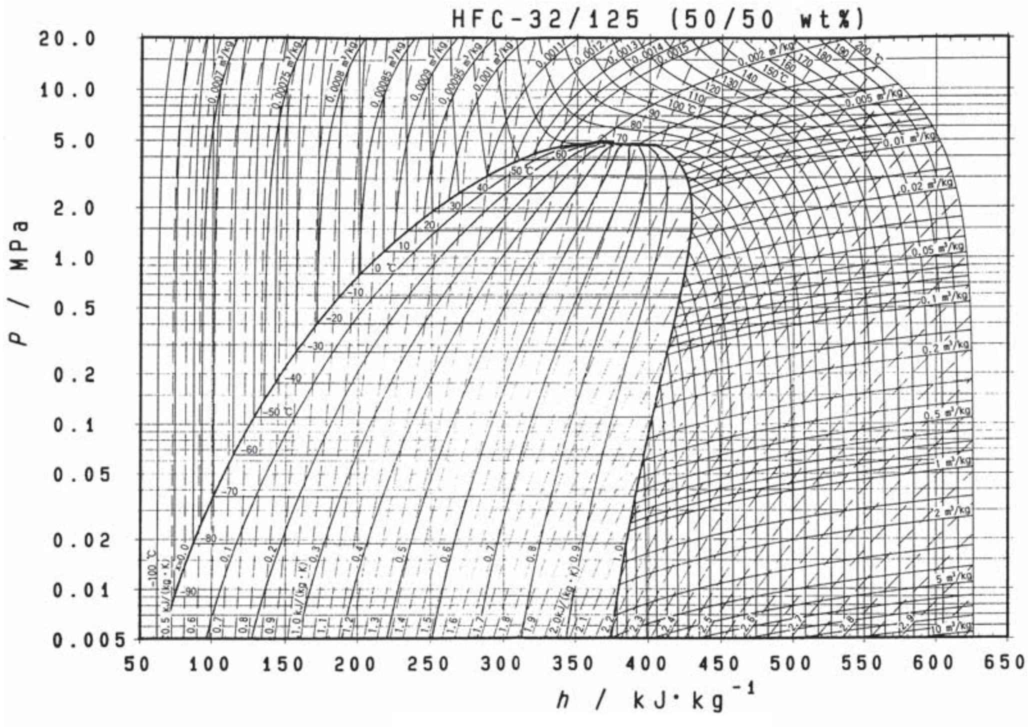
	HFC units (Units using new refrigerants)		HCFC units
Refrigerant name	R-407C	R-410A	R-22
Composing substances	Non-azeotropic mixture of HFC32, HFC125 and HFC134a (*1)	Quasi-azeotropic mixture of HFC32 and JFC125 (*1)	Single-component refrigerant
Design pressure	3.2 MPa (gauge pressure) = 32.6 kgf/cm^2	4.0 MPa (gauge pressure) = 40.8 kgf/cm^2	2.75MPa (gauge pressure) = 28.0 kgf/cm^2
Refrigerant oil	Synthetic oil (Ether)		Mineral oil (Suniso)
Ozone destruction factor (ODP)	0	0	0.05
Combustibility	None	None	None
Toxicity	None	None	None

★1. Non-azeotropic mixture refrigerant: mixture of two or more refrigerants having different boiling points.

★2. Quasi-azeotropic mixture refrigerant: mixture of two or more refrigerants having similar boiling points.

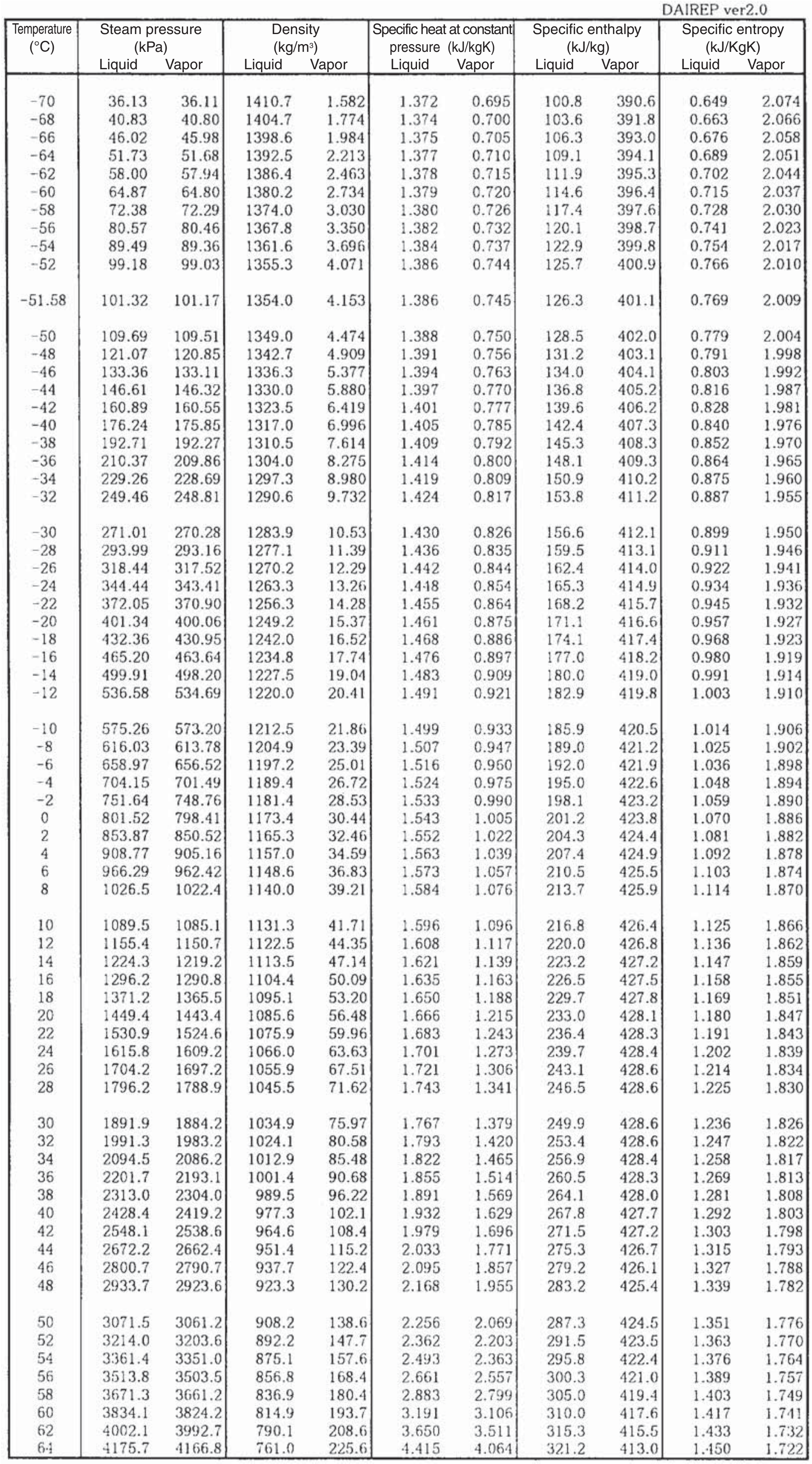
★3. The design pressure is different at each product. Please refer to the installation manual for each product.

(Reference) 1 MPa ≒ 10.19716 kgf / cm^2



Pressure-Enthalpy curves of HFC-32/125 (50/50wt%)

- Thermodynamic characteristic of R-410A



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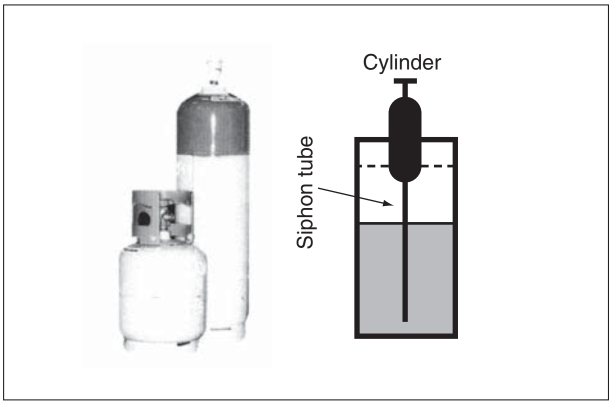
Temperature (°C)	Steam pressure (kPa)		Density (kg/m³)		Specific heat at constant pressure (kJ/kgK)		Specific enthalpy (kJ/kg)		Specific entropy (kJ/KgK)	
	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
-70	36.13	36.11	1410.7	1.582	1.372	0.695	100.8	390.6	0.649	2.074
-68	40.83	40.80	1404.7	1.774	1.374	0.700	103.6	391.8	0.663	2.066
-66	46.02	45.98	1398.6	1.984	1.375	0.705	106.3	393.0	0.676	2.058
-64	51.73	51.68	1392.5	2.213	1.377	0.710	109.1	394.1	0.689	2.051
-62	58.00	57.94	1386.4	2.463	1.378	0.715	111.9	395.3	0.702	2.044
-60	64.87	64.80	1380.2	2.734	1.379	0.720	114.6	396.4	0.715	2.037
-58	72.38	72.29	1374.0	3.030	1.380	0.726	117.4	397.6	0.728	2.030
-56	80.57	80.46	1367.8	3.350	1.382	0.732	120.1	398.7	0.741	2.023
-54	89.49	89.36	1361.6	3.696	1.384	0.737	122.9	399.8	0.754	2.017
-52	99.18	99.03	1355.3	4.071	1.386	0.744	125.7	400.9	0.766	2.010
-51.58	101.32	101.17	1354.0	4.153	1.386	0.745	126.3	401.1	0.769	2.009
-50	109.69	109.51	1349.0	4.474	1.388	0.750	128.5	402.0	0.779	2.004
-48	121.07	120.85	1342.7	4.909	1.391	0.756	131.2	403.1	0.791	1.998
-46	133.36	133.11	1336.3	5.377	1.394	0.763	134.0	404.1	0.803	1.992
-44	146.61	146.32	1330.0	5.880	1.397	0.770	136.8	405.2	0.816	1.987
-42	160.89	160.55	1323.5	6.419	1.401	0.777	139.6	406.2	0.828	1.981
-40	176.24	175.85	1317.0	6.996	1.405	0.785	142.4	407.3	0.840	1.976
-38	192.71	192.27	1310.5	7.614	1.409	0.792	145.3	408.3	0.852	1.970
-36	210.37	209.86	1304.0	8.275	1.414	0.800	148.1	409.3	0.864	1.965
-34	229.26	228.69	1297.3	8.980	1.419	0.809	150.9	410.2	0.875	1.960
-32	249.46	248.81	1290.6	9.732	1.424	0.817	153.8	411.2	0.887	1.955
-30	271.01	270.28	1283.9	10.53	1.430	0.826	156.6	412.1	0.899	1.950
-28	293.99	293.16	1277.1	11.39	1.436	0.835	159.5	413.1	0.911	1.946
-26	318.44	317.52	1270.2	12.29	1.442	0.844	162.4	414.0	0.922	1.941
-24	344.44	343.41	1263.3	13.26	1.448	0.854	165.3	414.9	0.934	1.936
-22	372.05	370.90	1256.3	14.28	1.455	0.864	168.2	415.7	0.945	1.932
-20	401.34	400.06	1249.2	15.37	1.461	0.875	171.1	416.6	0.957	1.927
-18	432.36	430.95	1242.0	16.52	1.468	0.886	174.1	417.4	0.968	1.923
-16	465.20	463.64	1234.8	17.74	1.476	0.897	177.0	418.2	0.980	1.919
-14	499.91	498.20	1227.5	19.04	1.483	0.909	180.0	419.0	0.991	1.914
-12	536.58	534.69	1220.0	20.41	1.491	0.921	182.9	419.8	1.003	1.910
-10	575.26	573.20	1212.5	21.86	1.499	0.933	185.9	420.5	1.014	1.906
-8	616.03	613.78	1204.9	23.39	1.507	0.947	189.0	421.2	1.025	1.902
-6	658.97	656.52	1197.2	25.01	1.516	0.960	192.0	421.9	1.036	1.898
-4	704.15	701.49	1189.4	26.72	1.524	0.975	195.0	422.6	1.048	1.894
-2	751.64	748.76	1181.4	28.53	1.533	0.990	198.1	423.2	1.059	1.890
0	801.52	798.41	1173.4	30.44	1.543	1.005	201.2	423.8	1.070	1.886
2	853.87	850.52	1165.3	32.46	1.552	1.022	204.3	424.4	1.081	1.882
4	908.77	905.16	1157.0	34.59	1.563	1.039	207.4	424.9	1.092	1.878
6	966.29	962.42	1148.6	36.83	1.573	1.057	210.5	425.5	1.103	1.874
8	1026.5	1022.4	1140.0	39.21	1.584	1.076	213.7	425.9	1.114	1.870
10	1089.5	1085.1	1131.3	41.71	1.596	1.096	216.8	426.4	1.125	1.866
12	1155.4	1150.7	1122.5	44.35	1.608	1.117	220.0	426.8	1.136	1.862
14	1224.3	1219.2	1113.5	47.14	1.621	1.139	223.2	427.2	1.147	1.859
16	1296.2	1290.8	1104.4	50.09	1.635	1.163	226.5	427.5	1.158	1.855
18	1371.2	1365.5	1095.1	53.20	1.650	1.188	229.7	427.8	1.169	1.851
20	1449.4	1443.4	1085.6	56.48	1.666	1.215	233.0	428.1	1.180	1.847
22	1530.9	1524.6	1075.9	59.96	1.683	1.243	236.4	428.3	1.191	1.843
24	1615.8	1609.2	1066.0	63.63	1.701	1.273	239.7	428.4	1.202	1.839
26	1704.2	1697.2	1055.9	67.51	1.721	1.306	243.1	428.6	1.214	1.834
28	1796.2	1788.9	1045.5	71.62	1.743	1.341	246.5	428.6	1.225	1.830
30	1891.9	1884.2	1034.9	75.97	1.767	1.379	249.9	428.6	1.236	1.826
32	1991.3	1983.2	1024.1	80.58	1.793	1.420	253.4	428.6	1.247	1.822
34	2094.5	2086.2	1012.9	85.48	1.822	1.465	256.9	428.4	1.258	1.817
36	2201.7	2193.1	1001.4	90.68	1.855	1.514	260.5	428.3	1.269	1.813
38	2313.0	2304.0	989.5	96.22	1.891	1.569	264.1	428.0	1.281	1.808
40	2428.4	2419.2	977.3	102.1	1.932	1.629	267.8	427.7	1.292	1.803
42	2548.1	2538.6	964.6	108.4	1.979	1.696	271.5	427.2	1.303	1.798
44	2672.2	2662.4	951.4	115.2	2.033	1.771	275.3	426.7	1.315	1.793
46	2800.7	2790.7	937.7	122.4	2.095	1.857	279.2	426.1	1.327	1.788
48	2933.7	2923.6	923.3	130.2	2.168	1.955	283.2	425.4	1.339	1.782
50	3071.5	3061.2	908.2	138.6	2.256	2.069	287.3	424.5	1.351	1.776
52	3214.0	3203.6	892.2	147.7	2.362	2.203	291.5	423.5	1.363	1.770
54	3361.4	3351.0	875.1	157.6	2.493	2.363	295.8	422.4	1.376	1.764
56	3513.8	3503.5	856.8	168.4	2.661	2.557	300.3	421.0	1.389	1.757
58	3671.3	3661.2	836.9	180.4	2.883	2.799	305.0	419.4	1.403	1.749
60	3834.1	3824.2	814.9	193.7	3.191	3.106	310.0	417.6	1.417	1.741
62	4002.1	3992.7	790.1	208.6	3.650	3.511	315.3	415.5	1.433	1.732
64	4175.7	4166.8	761.0	225.6	4.415	4.064	321.2	413.0	1.450	1.722

1.2 Refrigerant Cylinders

- ■ Cylinder specifications
- The cylinder is painted refrigerant color (pink).
- The cylinder valve is equipped with a siphon tube.



Refrigerant can be charged in liquid state with cylinder in upright position.

Caution: Do not lay cylinder on its side during charging, since it cause refrigerant in gas state to enter the system.

■ Handling of cylinders

(1) Laws and regulations

R-410A is liquefied gas, and the High-Pressure Gas Safety Law must be observed in handling them. Before using, refer to the High-Pressure Gas Safety Law.

The Law stipulates standards and regulations that must be followed to prevent accidents with high-pressure gases. Be sure to follow the regulations.

(2) Handing of vessels

Since R-410A is high-pressure gas, it is contained in high-pressure vessels.

Although those vessels are durable and strong, careless handling can cause damage that can lead to unexpected accidents. Do not drop vessels, let them fall, apply impact or roll them on the ground.

(3) Storage

Although R-410A is not flammable, it must be stored in a well-ventilated, cool, and dark place in the same way as any other high-pressure gases.

It should also be noted that high-pressure vessels are equipped with safety devices that releases gas when the ambient temperature reaches more than a certain level (fusible plug melts) and when the pressure exceeds a certain level (spring-type safety valve operates).

1.3 Service Tools

R-410A is used under higher working pressure, compared to previous refrigerants (R-22,R-407C). Furthermore, the refrigerating machine oil has been changed from Suniso oil to Ether oil, and if oil mixing is occurred, sludge results in the refrigerants and causes other problems. Therefore, gauge manifolds and charge hoses that are used with a previous refrigerant (R-22,R-407C) can not be used for products that use new refrigerants.

Be sure to use dedicated tools and devices.

- Tool compatibility

Tool	Compatibility			Reasons for change
	HFC		HCFC	
	R-410A	R-407C	R-22	
Gauge manifold Charge hose	×			• Do not use the same tools for R-22 and R-410A. • Thread specification differs for R-410A and R-407C.
Charging cylinder	×		❍	• Weighting instrument used for HFCs.
Gas detector	❍		×	• The same tool can be used for HFCs.
Vacuum pump (pump with reverse flow preventive function)	❍			• To use existing pump for HFCs, vacuum pump adapter must be installed.
Weighting instrument	❍			
Charge mouthpiece	×			• Seal material is different between R-22 and HFCs. • Thread specification is different between R-410A and others.
Flaring tool (Clutch type)	❍			• For R-410A, flare gauge is necessary.
Torque wrench	❍			• Torque-up for 1/2 and 5/8
Pipe cutter	❍			
Pipe expander	❍			
Pipe bender	❍			
Pipe assembling oil	×			• Due to refrigerating machine oil change. (No Suniso oil can be used.)
Refrigerant recovery device	Check your recovery device.			
Refrigerant piping	See the chart below.			• Only ϕ19.1 is changed to 1/2H material while the previous material is "O".

As for the charge mouthpiece and packing, 1/2UNF20 is necessary for mouthpiece size of charge hose.

- Copper tube material and thickness

Pipe size	R-407C		R-410A	
	Material	Thickness t (mm)	Material	Thickness t (mm)
ϕ6.4	O	0.8	O	0.8
ϕ9.5	O	0.8	O	0.8
ϕ12.7	O	0.8	O	0.8
ϕ15.9	O	1.0	O	1.0
ϕ19.1	O	1.0	1/2H	1.0
ϕ22.2	1/2H	1.0	1/2H	1.0
ϕ25.4	1/2H	1.0	1/2H	1.0
ϕ28.6	1/2H	1.0	1/2H	1.0
ϕ31.8	1/2H	1.2	1/2H	1.1
ϕ38.1	1/2H	1.4	1/2H	1.4
ϕ44.5	1/2H	1.6	1/2H	1.6

* O: Soft (Annealed)
H: Hard (Drawn)

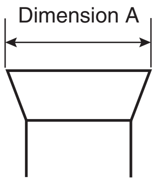
1. Flaring tool

- ■ Specifications
- Dimension A

Unit:mm

Nominal size	Tube O.D.	$A^{+0}_{-0.4}$	
	Do	Class-2 (R-410A)	Class-1 (Conventional)
1/4	6.35	9.1	9.0
3/8	9.52	13.2	13.0
1/2	12.70	16.6	16.2
5/8	15.88	19.7	19.4
3/4	19.05	24.0	23.3

- ■ Differences
- Change of dimension A



For class-1: R-407C
For class-2: R-410A

Conventional flaring tools can be used when the work process is changed.
(change of work process)
Previously, a pipe extension margin of 0 to 0.5mm was provided for flaring. For R-410A air conditioners, perform pipe flaring with a pipe extension margin of 1.0 to 1.5mm.
(For clutch type only)
Conventional tool with pipe extension margin adjustment can be used.

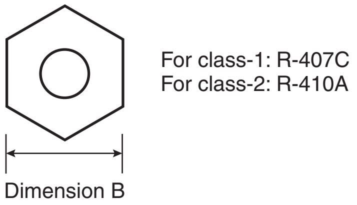
2. Torque wrench

- ■ Specifications
- Dimension B Unit:mm

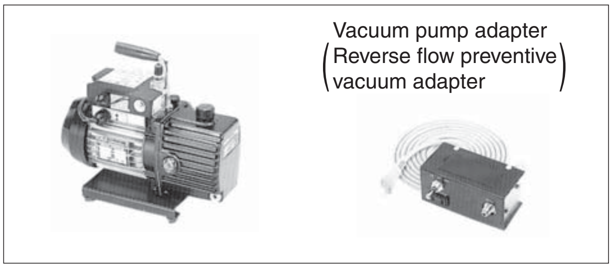
Nominal size	Class-1	Class-2	Previous
1/2	24	26	24
5/8	27	29	27

No change in tightening torque
No change in pipes of other sizes

- ■ Differences
- Change of dimension B
  Only 1/2", 5/8" are extended



3. Vacuum pump with check valve



- ■ Specifications
- Discharge speed
  50 l/min (50Hz)
  60 l/min (60Hz)
- Suction port UNF7/16-20(1/4 Flare)
  UNF1/2-20(5/16 Flare) with adapter
- Maximum degree of vacuum
  Select a vacuum pump which is able to keep the vacuum degree of the system in excess of –100.7 kPa (5 torr – 755 mmHg).

- ■ Differences
- Equipped with function to prevent reverse oil flow
- Previous vacuum pump can be used by installing adapter.

4. Leak tester

- Specifications
- Hydrogen detecting type, etc.
- Applicable refrigerants
  R-410A, R-407C, R-404A, R-507A, R-134a, etc.

- Differences
- Previous testers detected chlorine. Since HFCs do not contain chlorine, new tester detects hydrogen.

5. Refrigerant oil (Air compal)

- Specifications
- Contains synthetic oil, therefore it can be used for piping work of every refrigerant cycle.
- Offers high rust resistance and stability over long period of time.

- Differences
- Can be used for R-410A and R-22 units.

6. Gauge manifold for R-410A

- Specifications
- High pressure gauge
  - 0.1 to 5.3 MPa (-76 cmHg to 53 kg/cm^2)
- Low pressure gauge
  - 0.1 to 3.8 MPa (-76 cmHg to 38 kg/cm^2)
- 1/4" → 5/16" (2min → 2.5min)
- No oil is used in pressure test of gauges.
  → For prevention of contamination
- Temperature scale indicates the relationship between pressure and temperature in gas saturated state.

- ■ Differences
- Change in pressure
- Change in service port diameter

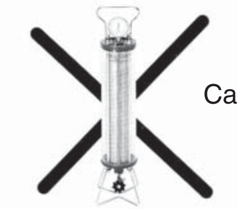
7. Charge hose for R-410A

(Hose with ball valve)

- ■ Specifications
- Working pressure 5.08 MPa (51.8 kg/cm^2)
- Rupture pressure 25.4 MPa (259 kg/cm^2)
- Available with and without hand-operate valve that prevents refrigerant from outflow.

- ■ Differences
- Pressure proof hose
- Change in service port diameter
- Use of nylon coated material for HFC resistance

8. Charging cylinder



Can not be used

- ■ Specifications
- Use weigher for refrigerant charge listed below to charge directly from refrigerant cylinder.

- ■ Differences
- The cylinder can not be used for mixed refrigerant since mixing ratio is changed during charging.

  When R-410A is charged in liquid state using charging cylinder, foaming phenomenon is generated inside charging cylinder.

9. Weigher for refrigerant charge

- ■ Specifications
- High accuracy

TA101A (for 10-kg cylinder) = ± 2g
TA101B (for 20-kg cylinder) = ± 5g

- Equipped with pressure-resistant sight glass to check liquid refrigerant charging.
- A manifold with separate ports for HFCs and previous refrigerants is equipped as standard accessories.

■ Differences

- Measurement is based on weight to prevent change of mixing ratio during charging.

10. Charge mouthpiece

■ Specifications

- For R-410A, 1/4"→ 5/16" (2min → 2.5min)
- Material is changed from CR to H-NBR.

■ Differences

- Change of thread specification on hose connection side (For the R-410A use)
- Change of sealer material for the HFCs use.

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